INT FISHERIES

Livestock-Fishery Interaction Studies

BEAR VALLEY, IDAHO

DUP
Thesis/
Reports
Platts,
W.S.

LOAN COPY

EFFECTS OF LIVESTOCK GRAZING ON AQUATIC AND RIPARIAN ENVIRONMENTS AND FISHERIES IN HIGH MOUNTAIN MEADOWS

Bear Valley Creek, Valley County, Idaho

Progress Report 2: June 1975 through January 1986

Presented to Terry Holubetz
Idaho Department of Fish and Game
State Office
Boise, Idaho

William S. Platts
Rodger Loren Nelson

USDA - Forest Service
Intermountain Forest and Range Experiment Station
Forestry Sciences Laboratory
Boise, Idaho

CONTENTS

	Page
EXECUTIVE SUMMARY	i
INTRODUCTION	1
STUDY AREA DESCRIPTION	4
Vegetation	4
Fisheries	4
Mining History	5
Grazing History	5
Bear Valley C & H Allotment	6
METHODS	9
Study Design	9
Habitat Variables Measured	11
RESULTS AND DISCUSSION	11
Lower Bear Valley	11
Geomorphic/Aquatic Analysis	11
Streambank Variables	17
Stream Bottom Variables	18
Riparian Analyses	20
Riparian Community Classification	22
Streamside Herbage Analyses	24
Fish Population Analyses	24
Hydrologic Analysis	30
Upper Bear Valley	33
Geomorphic/Aquatic Analysis	33
Water Column Variables	33
Streambank Variables	38
Stream Bottom Variables	38
Riparian Analyses	40
Riparian Community Classification	42
Streamside Herbage Analyses	42
Fish Population Analyses	42
Hydraulic Geometry Analysis	48
CONCLUSIONS	52
LITERATURE CITED	53
APPENDICES	55

EXECUTIVE SUMMARY

Seven years of fisheries and riparian habitat evaluation and 5 years of fish evaluation sampling in two study areas situated on the upper reaches of Bear Valley Creek are discussed. Within the study areas, Bear Valley Creek is suboptimal with respect to fishery needs, reflecting a history of various land use practices. Chinook salmon and steelhead rainbow trout were almost absent in the study areas and reflects low seeding from low anadromous runs. Native bull trout were less abundant than exotic Eastern brook trout, and bull - brook hybrids were common. Sculpin were clearly the dominant fish species.

Improving fishery habitat trends in ungrazed treatment sites within each study area were indicated with respect to some habitat descriptors. Current livestock management may be influencing the quality of riparian habitat conditions, but some unusually poor forage years were included in the study period necessitating modification of the three-pasture rest-rotation system. At this time, definite influences from livestock grazing cannot be completely determined. High amounts of channel fine sediments probably relate to past upstream dredge mining. In addition, current information suggests that riparian habitat in Bear Valley may respond slowly to influential forces.

Plans for revitalizing this study and coordinating it with concurrent Idaho Fish and Game and Shoshone-Bannock and Nez Perce tribal rehabilitation efforts are discussed.

INTRODUCTION

Much of the land surface of the western United States is administered by public agencies. In Idaho, for example, about 64 percent of the State's land is under Federal administration; some 95 percent being managed by either the U.S. Forest Service (USFS) or the Bureau of Land Management (BLM) (Cast 1974). Of these two public agencies, the USFS is largely responsible for management of the Nation's forested timber and rangelands, 83 percent of which are located in the 11 western states (USDA 1972). Consequently, large areas of land surface in the western United States are administered by the Forest Service as part of the National Forest System, and must be managed for multiple use purposes as directed by the Multiple Use - Sustained Yield Act of 1960 (PL 86-517) and recent additional modifying legislation. In Idaho alone, the Forest Service was responsible for the administration of some 20,132,000 acres of forest and range lands in 1976 (USDA 1980).

The philosophy of multiple use management recognizes the need for national resources to be managed for the present and future needs of American citizens as a whole. Use of public lands for such special uses as livestock grazing, timber harvesting, and mining are encouraged, but such use must be balanced with other interacting and possibly competitive uses without undue degradation of the land. In addition, the Act specifically recognizes that widespread deterioradation of rangeland, fish, and wildlife habitat has occurred, and mandates rehabilitation efforts. Before effective and cost-efficient rehabilitative efforts can be implemented, however, and before the effectiveness of such efforts can be evaluated, detailed understanding of range, aquatic, and riparian habitats and the interactions between them must be achieved, and suitable techniques for evaluating existing and potential habitat conditions must be devised, tested, and standardized.

The past decade has witnessed an increase in studies evaluating the status and potential of streams as habitats for aquatic organisms, and the interaction of aquatic and terrestrial habitats through the interface of the riparian zone. Stream inventories, monitoring, habitat research studies, assessments, channel and streamflow condition evaluations, and classification have been used to evaluate this potential. The success or failure of any of these studies to provide valid interpretations, however, ultimately depends on their suitability, comprehensiveness, and accuracy. Interpretations derived from many of these efforts, however, have been used by planners and decisionmakers on the unsupported assumption that they truly described stream habitat conditions and biotic communities.

On grazed watersheds, problems are compounded by the fact that fishery managers must interact with range managers, as well as the need to determine what impact current range management strategies are having on local fisheries through the interface of riparian ecosystems. Since riparian vegetation typically comprises only a small fraction of the total forage on a grazing allotment, it has frequently been ignored in grazing management. Because of abundant, readily available drinking water, gentle terrain, shade, and often more palatable vegetation,

cattle tend to selectively utilize riparian areas at certain times of the year. Since riparian ecosystems also provide a variety of critical fishery needs, such as overhead cover, streamflow, temperature and erosion regulation, filtering of pollutants and soil from adjacent uplands, and allochthonous energy in the form of food for aquatic invertebrates (Minshall 1967), there has been considerable recent interest among fishery professionals to evaluate, monitor, manage, and enhance degraded streams on western rangelands.

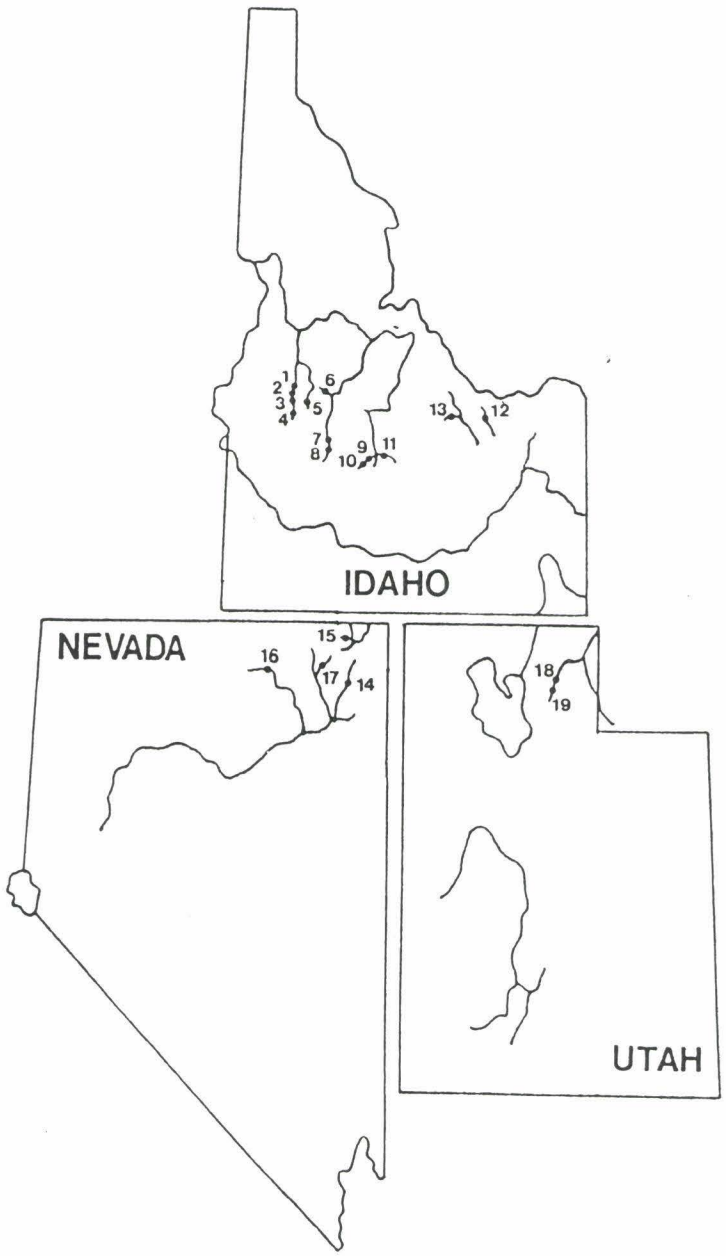
The literature indicates that fishery biologists have intuitively hypothesized that inappropriate livestock grazing can degrade fisheries by excessive use of riparian ecosystems, but that proper grazing would exert little negative stress. Modification of fishery habitat from improper grazing is expected to occur through changes in certain key fishery habitat features, including:

1. Increasing channel width through bank trampling and a corresponding decline in stream depth.

2. Increasing amounts of riffle at the expense of high quality pools.

3. Increased temperatures and poor cover conditions because of reduced vegetation canopy.

Evidence that supports these hypotheses is accumulating, but continued refinement and standardization of evaluation techniques and performance of additional studies that will identify, quantify, and evaluate the merits of alternative management programs are needed before coordinated management of range and fishery resources on western rangelands will be effective. These Livestock-Fishery Interaction Studies, of which the Bear Valley Studies are only a small part, comprise just such a comprehensive program to develop, test, and distribute an array of field and office techniques that will help clarify the complex interactions that often occur between different grazing intensities, classes of livestock, grazing strategies, and fisheries. Similar studies are also being conducted in 13 other study areas in Idaho on USFS and BLM land, on four study areas in Nevada on USFS and BLM land, and in two study areas on BLM land in Utah (Figure 1). In addition, this effort on Bear Valley Creek is being coordinated with cooperative efforts between Idaho Department of Fish and Game (IFG), the Boise National Forest (Idaho), and Shoshone-Bannock Tribal fisheries to improve anadromous fish production in the Upper Columbia River drainage. The intent of these studies is to identify grazing strategies that allow riparian forage use while remaining consistent with the maintenance of quality fishery habitat. This report is being presented to Idaho Department of Fish and Game to satisfy cooperative study obligations, and is a companion volume to the enhancement project report (Platts et al. 1986).



IDAHO BATHOLITH

1. SFSR-Lower Stolle
2. SFSR-Cougar Stolle
3. SFSR-Guard Stolle
4. SFSR-Upper Stolle
5. Johnson Creek
6. Elk Creek
7. Lower Bear Valley
8. Upper Bear Valley
9. Lower Frenchman Creek
10. Upper Frenchman Creek
11. Horton Creek

LOST RIVERS AREA

12. Birch Creek
13. Wet Creek

NORTHEASTERN NEVADA

14. Tabor Creek
15. Cottonwood Creek
16. Gance Creek
17. Chimney Creek

NORTHEASTERN UTAH

18. Lower Big Creek
19. Upper Big Creek

Figure 1. Geographic distribution of livestock-fishery study areas in the Intermountain West.

STUDY AREA DESCRIPTIONS

Two replicate study sites were selected on Bear Valley Creek to determine fishery habitat conditions and for evaluation of current grazing management with respect to fishery needs and methodology development. Both sites were situated near the upper (southern) end of Bear Valley at an elevation of approximately 6,500 ft above mean sea level. The two study areas were separated by about 1-stream-mile, the lower area being near the confluences of Mace and Sheeptrail Creeks downstream from the Lowman-Deadwood Road, the upper area being about .25 mi upstream from the Lowman-Deadwood Road. Bear Valley Creek and its several tributaries in this area have their source in weakly glaciated, cryoplanated granitic uplands of the southern Idaho batholith. Bear Valley, which is a structural depression within the batholith, has been filled with Quaternary alluvium derived from the surrounding uplands, resulting in a meandering, low gradient stream containing large amounts of gravel and rubble substrate materials. Streams in similar depositional landtypes in the South Fork Salmon River drainage have been shown to produce the largest numbers of fish species, with communities dominated by chinook salmon (*Oncorhynchus tschawytscha* Walbaum)(Platts 1979). Two additional study areas, in Poker Meadows and near the confluence of Fir Creek, are discussed in Platts et al. (1986).

Vegetation and Climate

Climatic conditions in Bear Valley are among the most severe in Idaho. Precipitation is normally about 48 inches annually, ranging from a low of about 25 inches on the valley floor to as much as 60 inches in the surrounding mountains; approximately 75 percent of this falls as snow during long, cold winters in which the January mean temperature is 0°F. Summer weather is normally warm and dry, but is subject to occasional intense convectional storms; snow can fall during any given month. Consequently, highland vegetation is typically forest comprising Englemann spruce (*Picea englemanni*) and subalpine fir (*Abies lasiocarpa*), with long-term seral stands of lodgepole pine (*Pinus contorta*) descending to the valley floor. Valley floor vegetation is predominantly grassy with upland areas dominated by such species as Idaho fescue (*Festuca idahoensis*) and Columbia needlegrass (*Stipa columbiana*) grading into a riparian ecosystem containing a variety of grasses, sedges, and willows. Representative riparian species include water sedge and beaked sedge (*Carex aquatilis* and *C. rostrata*), bluejoint (*Calamagrostis canadensis*), and Wolf's willow (*Salix wolfii*).

Fisheries

Resident fish species in Bear Valley include several species of salmonids, including rainbow trout (*Salmo gairdneri* Richardson), bull trout (*Salvelinus confluentus* [Suckley]), Eastern brook trout (*Salvelinus fontinalis* [Mitchill]), mountain whitefish (*Prosopium williamsoni* [Girard]), and at least one species of sculpin. Bear Valley Creek has also been an historically important spawning tributary for anadromous chinook salmon and steelhead (rainbow) trout from the Middle Fork Salmon River.

Mining History

Mineral exploration began in Bear Valley in 1950 when the Porter Brothers Corporation began searching the area for rare earths and other minerals. Significant deposits of these historically valuable substances, including columbium, tantalum, and yttrium were discovered, and dredge mining operations were initiated at the upper (southern) end of Bear Valley in the mid-1950's. The chief value of these minerals, however, was derived from their importance to the vacuum-tube electronics industry, so commercially profitable mining for them in Bear Valley was short-lived, and came to a halt at the end of the decade.

The environmental effects of these mining operations, however, have proved to be much more tenacious because of poor management and planning. Canals constructed to divert stream water from Bear Valley Creek and its tributaries were poorly constructed, resulting in both frequent dewatering and sediment inundation of Bear Valley Creek when canals were breached (Platts and Rountree 1972). Some restorative efforts were undertaken in 1969, including closing the main canal, releasing Bear Valley Creek to find its own channel, and heavy equipment work to keep Bear Valley Creek away from tailings ponds, but they largely failed; the new Bear Valley Creek channel could not withstand the stream's erosive power, and large amounts of channel and bank materials were pumped downstream.

Platts (1968) estimated that the dredging operations directly altered about 3 acres of anadromous salmonid spawning habitat, and there have certainly been additional indirect impacts to anadromous and fishery habitat in general as a result of increased bedload transport and sediment deposition; some of this is probably still occurring. Additionally, there is the problem of colloidal leachates from tailings ponds, and the possibility of failure of tailings water containment at some future date. Efforts to rehabilitate the dredged area were begun by the Shoshone-Bannock Tribes in the fall of 1985.

Grazing History

Prior to the appearance of European man in the upper reaches of the Salmon River system, native forage was grazed principally by wild ungulates, rodents, and insects. With settlement of the Snake River Plain, however, white settlers quickly recognized the valuable forage potential of the broad, meandering meadows of the Idaho batholith and soon began using these high elevation rangelands as sources of summer livestock forage. Bear Valley, with its abundant, high quality forage, its proximity to agricultural centers in southern Idaho, and its location on an important stock driveway, has figured prominently in this story.

Records of actual livestock use in Bear Valley during Idaho's pioneer days are virtually nonexistent, but some information has survived. As was typical in America's mountainous west, sheep and sheepmen arrived first, sometime in the late 1800's and possibly as recently as 1880. Large bands of sheep, most notably those of William Cupp, were trailed through Bear Valley on their way to Ketchum, Idaho,

for shipping to market. In the period 1902 to 1916, some 5,000 sheep were trailed through Bear Valley, annually, and Ketchum, hub of central Idaho's booming sheep industry, was the largest sheep shipping port in the United States. Although several peripheral watersheds and tributaries of Bear Valley Creek continue to be grazed by sheep bands to this day, they have been eliminated from Bear Valley proper since 1916.[1/]

Cattle were first brought into Bear Valley somewhat later than sheep, and cattle made their appearance sometime in the late 1890's or early 1900's. Early records are, of course, inadequate, but the typical western pattern during those days was one of intense competition for use of the range by cattle and sheep operations and intense competition for forage by individual animals. Cattle quickly gained in importance, and by 1916 sheep were eliminated from the Bear Valley study site area in favor of cattle. In 1931, the U.S. Forest Service began keeping permanent records of livestock use and it is clear that the number of cattle has generally increased from some 1342 head in 1931 to 1637 head in 1971, whereas the intensity in Animal Months (AM) has remained fairly stable (Table 1). Some of this increase since 1961 is probably due to improvements in range carrying capacity, but the extremely low level of use in 1945 (1,112 head), conversely, may be due to the fact that use at that time is estimated to have been three to five times greater than the carrying capacity (See footnote 1). Prevailing economic conditions during the Great Depression and World War II periods must undoubtedly have influenced both use and administrative attitudes when use was high relative to range conditions and deterioration was severe; however, these are beyond the scope of this report.

Table 1.--Summary of cattle use in Bear Valley from 1931-1971.

	Year					
	1931	1935	1945	1955	1965	1971
Actual Number (#)	1342	1541	1112	1501	1320	1637
Animal Months (AM)	5716	6021	3774	5627	4364	5538

Bear Valley C & H Allotment

The Bear Valley C & H Allotment comprises 11,468 acres of forest and range land, only 53 percent (6,122 acres) of which is suitable for livestock grazing (See footnote number 1). It was formerly called the Gem County Allotment because of its use, apparently since its inception in 1957, by members of the Gem County Cattlemen's Association (GCCA),

[1/] There is some evidence that sheep did enter the area in the 1920's, but when or how is unclear (USDA Forest Service [n.d.]).

which evolved from the Emmett-Payette Woolgrowers Association, established in 1909 by Andrew Little, J. E. Van Deusen, and John Bruce. Gem County operators are now represented in Bear Valley by the Little Cattle Company and the McGregor Land and Livestock Company, sole permittees on the Bear Valley Allotment. Although Little Cattle Company inherited its grazing preference in Bear Valley, McGregor Land and Livestock Company's permit was purchased from other permittees.

Range analysis by allotment, a practice that began in 1957, indicated a need for 70 percent reduction in use on the Boise National Forest as a whole. In 1961, the Forest Service proceeded with needed management improvements by initiating a rest-rotation grazing strategy coupled with applications of herbicide (2,4-D ester) to control undesireable grass species (so called "increasers" because they increase in abundance under conditions of heavy livestock use).

The original rest-rotation design partitioned the Gem County Allotment into 10 grazed pastures [2/] and one holding pasture with a grazing season of 1 July to 15 October divided into spring, summer, and fall grazing periods, and permitted for 857 cow-calf pairs. These pastures were to be operated as a five unit system in which each pair of pastures was to receive 2 years of rest with herbicide application during the first year in a rest period (Table 2). Improvements were observed quickly, and a 66 percent increase in forage production was recorded in the fall of 1967.

This scenario has been modified with use several times, resulting, in 1974, in the name change to the Bear Valley C & H Allotment and the combining of several pastures into two holding pastures and three large, grazed pastures rotated under a three year cycle (Table 3).

[2/] The record is confusing on this point, but for convenience we have assumed that the Bearskin pasture that appears on some maps was part of the Transfer Cabin pasture.

Table 2.--Rotation and herbicide spray application established for the Gem County C & H Allotment (See footnote number 1).

Year	Wyoming Bruce Mdws.	Sack-Cache	Bear Valley-Airport	Sheeptrail-Cook Creek	Transfer Cabin-Big Meadows
1967	Rest	Rest	Fall	Spring	Summer
1968	Summer	Rest	Rest/spray	Fall	Spring
1969	Spring	Summer	Rest	Rest/spray	Fall
1970	Fall	Spring	Summer	Rest	Rest/spray
1971	Rest/spray	Fall	Spring	Summer	Rest
1972	Rest	Rest/spray	Fall	Spring	Summer

Table 3.--Bear Valley C & H Allotment rotation cycle and estimated grazing capacity.[1/] [2/]

Year	Airport[3/] (194 A.U.M.)	Bear Valley (1433 A.U.M.)	Sheeptrail (1242 A.U.M.)	Big Meadows (1874 A.U.M.)	Mace[4/] (152 A.U.M.)
1974	Holding	Rest	Early	Late	Holding
1975	Rest	Early	Late	Rest	Holding
1976	Rest	Late	Rest[5/]	Early	Holding
1977	Rest	Rest	Early	Late	Holding
1978	Rest	Early	Late	Rest	Holding
1979	Rest	Late	Rest	Early	Holding
1980	Rest	Rest	Early	Late	Holding
1981	Rest	Early	Late	Rest	Holding
1982	Rest	Late	Rest	Early	Holding

1/ From files of USDA Forest Service, Boise National Forest, Lowman Ranger District, Lowman, Idaho.

2/ Includes private land administered by U.S. Forest Service.

3/ Rested but used in emergencies as a holding pasture.

4/ This holding pasture was created to hold animals in the fall during roundup. Previously, Transfer Cabin pasture had been used for spring and fall holding practices, which had damaged the pasture extensively. Use Boise National Forest study team ref. (see footnote 1)

5/ In neither 1976 nor 1979 did Sheeptrail pasture receive full rest.

Under this system, an early pasture is stocked on approximately 1 July and grazed until seed-ripe (approximately 25 August, depending on range conditions), a late pasture is grazed from seed-ripe until 15 October, and one pasture is rested. Considerable flexibility in animal distribution and timing of grazing is maintained with this system, and herbicide applications have continued during rested seasons. For convenience, a summary of recent grazing use is included in Table 4.

Table 4.--Summary of recent cattle and horse use, Bear Valley Allotment, Valley County, Idaho.[1/]

Year	Animal Numbers		Animal Months	
	Permit	Actual	Permit	Actual
1972	978	989	3423	3499
1973	978	980	3423	3467
1974	978	989	3424	3249
1875	978	963	3229	3226
1976	978	N.D.	3423	N.D.
1977	978	972	3403	N.D.
1978	N.D.	N.D.	3423	N.D.
1979	978	N.D.	3423	N.D.

[1/] See footnote number 1. Inspection of Forest Service records revealed many gaps and inconsistencies. Where numbers did not add up to specified totals, we have used their totals rather than adding; totals obtained this way never exceeded the officially authorized permit level.

METHODS

Study Design

The basic study design of each study area consisted first of stratifying 1,800 ft of stream reach into 181 channel cross sections placed at 10-ft intervals (Figure 2); the location of the central cross section was determined randomly. The study area was then subdivided into three sections of 600 ft each, with the central section designated for experimental treatment and the other two as up- and downstream controls. On Bear Valley Creek, the central or treatment site of each study area was fenced to exclude livestock from the riparian zone in order to compare fishery habitat conditions and trends with those existing under normal allotment management, and to provide for monitoring on an annual basis.

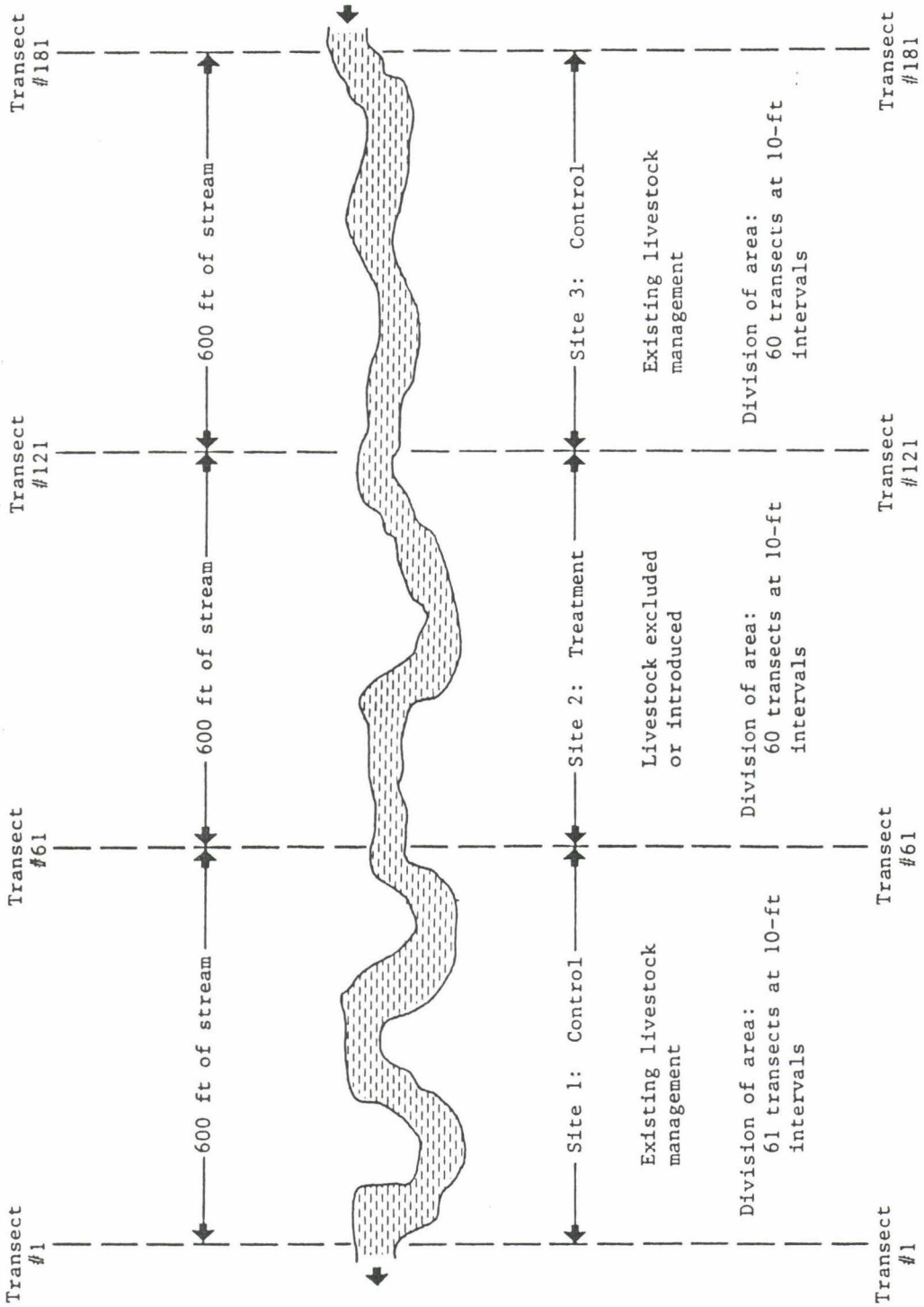


Figure 2. Schematic diagram of Livestock-Fishery Interaction Studies basic design.

Habitat Variables Measured

The variables evaluated on Bear Valley Creek fall into four basic categories: (1) geomorphic/aquatic, (2) riparian, (3) hydrologic, and (4) fisheries. Specific types of measurement included:

Geomorphic/Aquatic Analyses

1. Substrate materials and embeddedness.
2. Stream width and depth.
3. Streambank angle, undercut, and streamshore depth.
4. Pool width, quality, and feature or origin, and riffle width.
5. Canopy cover, light intensity, and insolation.

Riparian Analyses

7. Streamside habitat and cover types.
8. Streambank stability.
9. Overhanging vegetation.
10. Vegetation use and streambank alteration.
11. Riparian community type classification.

Hydrologic Analyses

12. Channel cross section profile.
13. Channel gradient and water velocity.

Fish Population Analyses

14. Fish species composition, abundance, and biomass.

Detailed descriptions of the techniques used to evaluate each of these habitat descriptors can be found in several complementary publications[3/] and are not included in this report at this time.

RESULTS AND DISCUSSION

Lower Bear Valley

Geomorphic/Aquatic Analyses

Bear Valley Creek is fairly large in the study area (Table 5), and ranged in width over the course of the study from 20.8 to 39.4 feet depending upon location within the study area. Site 1, the downstream control site, was generally the widest of the three study sites, due to

---

[3/] The principal publications providing detailed descriptions of these techniques are: Platts et al. (1983), Platts et al. (in press), and Jensen and Tuhy (1982).

Table 5.--Summary of annual geomorphic/aquatic and riparian analysis means, Lower Bear Valley, Idaho, 1975-1985.

Variable	Study Site 1										
	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Water column											
Stream width (feet)	NA	36.5	24.1	37.4	35.0	35.8	35.5	39.4	NA	NA	36.3
Channel width (feet)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	38.2
Stream depth (feet)	NA	0.82	0.57	0.80	0.68	0.73	0.82	1.19	NA	NA	0.75
Riffle width (percent)	NA	68.8	75.7	66.2	38.4	9.0	68.0	20.5	NA	NA	21.6
Pool width (percent)	NA	31.2	24.3	33.8	61.6	91.0	32.0	79.7	NA	NA	78.4
Pool quality	NA	3.4	2.8	2.1	3.8	3.9	2.9	3.9	NA	NA	3.6
Pool feature	NA	6.3	4.5	1.0	1.0	1.0	6.1	5.2	NA	NA	5.1
Streambanks											
Bank angle (degrees)	NA	103	101	84	84	93	90	78	NA	NA	96
Bank undercut (feet)	NA	0.52	0.2	0.29	0.34	0.33	0.32	0.41	NA	NA	0.29
Shore depth (feet)	NA	0.47	0.23	0.28	0.29	0.34	0.41	0.59	NA	NA	0.35
Fisheries rating	NA	2.9	3.3	3.3	3.0	3.2	2.4	2.8	NA	NA	NA
Streambottom											
Total fines (percent)	NA	21.4	31.8	25.1	35.3	34.8	36.4	41.0	NA	NA	35.6
Fines <0.03 in. (percent)	NA	NA	14.7	1.6	20.2	19.2	28.1	27.1	NA	NA	23.7
Fines >0.03 in. (percent)	NA	21.4	17.1	23.5	15.1	15.6	8.3	13.9	NA	NA	11.9
Gravel (percent)	NA	42.9	35.2	58.8	44.7	41.8	45.5	44.2	NA	NA	35.5
Rubble (percent)	NA	33.2	26.8	13.8	17.0	18.9	15.0	10.4	NA	NA	24.6
Boulder (percent)	NA	2.2	5.2	1.4	3.0	4.7	3.0	4.4	NA	NA	4.4
Embeddedness (rank)	NA	3.3	3.1	2.6	2.3	2.7	2.7	2.4	NA	NA	1.1
(percent)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	86.4
Instream cover (feet)	NA	NA	NA	2.8	11.1	1.6	1.5	NA	NA	NA	7.4
Riparian											
Stream cover	NA	2.1	1.8	2.0	1.9	1.9	1.9	1.9	NA	NA	1.9
Bank stability (rank)	NA	2.4	2.7	3.5	2.9	2.7	3.4	3.1	NA	NA	3.5
(percent)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	79
Habitat type	NA	15.7	14.6	16.1	13.9	14.8	14.0	15.2	NA	NA	14.5
Vegetative use (percent)	NA	75	74	70	17	77	63	<1	NA	NA	1
Alteration (percent)											
Natural	NA	14	33	11	16	9	12	8	NA	NA	23
Artificial	NA	25	6	54	13	37	29	21	NA	NA	15
Total	NA	39	39	65	29	46	41	29	NA	NA	38
Vegetative overhang (feet)	NA	0.68	0.65	0.10	0.33	0.33	0.16	0.35	NA	NA	0.38
Canopy (degrees)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Light intensity (percent)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
(x 10^2 ft candles)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 5.--(Continued)

Variable	Study Site 2										
	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Water column											
Stream width (feet)	NA	32.5	23.9	34.5	31.8	31.7	33.1	37.2	NA	NA	33.0
Channel width (feet)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	37.2
Stream depth (feet)	NA	0.79	0.70	0.87	0.70	0.75	0.86	1.20	NA	NA	0.83
Riffle width (percent)	NA	76.1	71.4	74.8	55.9	10.5	61.8	31.2	NA	NA	23.5
Pool width (percent)	NA	23.9	28.6	25.2	44.1	89.5	38.2	68.8	NA	NA	76.5
Pool quality	NA	3.2	3.5	2.1	3.4	4.8	3.7	3.8	NA	NA	4.2
Pool feature	NA	6.1	5.5	1.0	1.0	1.0	7.6	5.3	NA	NA	5.5
Streambanks											
Bank angle (degrees)	NA	123	107	103	105	103	100	94	NA	NA	106
Bank undercut (feet)	NA	0.19	0.2	0.18	0.17	0.22	0.28	0.3	NA	NA	0.23
Shore depth (feet)	NA	0.35	0.21	0.22	0.19	0.26	0.4	0.58	NA	NA	0.41
Fisheries rating	NA	2.7	3.7	2.9	2.6	3.5	2.6	2.9	NA	NA	NA
Streambottom											
Total fines (percent)	NA	46.5	50.5	30.3	44.6	41.3	43.7	40.8	NA	NA	41.7
Fines <0.03 in. (percent)	NA	NA	30.6	6.0	25.9	26.4	38.9	23.1	NA	NA	26.9
Fines >0.03 in. (percent)	NA	46.5	19.9	24.3	18.7	14.9	4.8	17.7	NA	NA	14.8
Gravel (percent)	NA	37.8	32.7	56.8	41.3	41.7	41.2	46.9	NA	NA	42.0
Rubble (percent)	NA	14.0	15.3	12.0	13.3	15.9	14.0	10.5	NA	NA	14.7
Boulder (percent)	NA	1.7	1.5	1.0	0.7	1.1	1.2	1.8	NA	NA	1.6
Embeddedness (rank)	NA	2.7	2.4	3.0	2.2	2.5	2.8	2.6	NA	NA	1.1
(percent)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	88.5
Instream cover (feet)	NA	NA	NA	2.5	7.4	1.7	1.8	NA	NA	NA	7.3
Riparian											
Stream cover	NA	2.0	1.9	2.0	1.8	1.9	1.8	2.0	NA	NA	1.9
Bank stability (rank)	NA	2.3	2.4	3.2	2.8	2.7	3.2	3.3	NA	NA	3.3
(percent)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	72
Habitat type	NA	14.3	13.7	14.6	15.0	14.6	13.5	15.3	NA	NA	13.7
Vegetative use (percent)	NA	77	43	10	0	24	4	0	NA	NA	0
Alteration (percent)											
Natural	NA	18	32	18	19	7	12	19	NA	NA	35
Artificial	NA	21	10	34	12	30	33	7	NA	NA	10
Total	NA	39	42	52	31	37	35	26	NA	45	
Vegetative overhang (feet)	NA	0.45	0.61	0.25	0.30	0.44	0.27	0.38	NA	NA	0.39
Canopy (degrees)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Light intensity (percent)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
(x 10^2 ft candles)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 5.--(continued)

Variable	Study Site 3										
	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Water column											
Stream width (feet)	NA	31.9	20.8	33.0	30.8	31.0	32.2	34.8	NA	NA	32.2
Channel width (feet)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	34.0
Stream depth (feet)	NA	0.85	0.63	0.92	0.81	0.79	0.87	1.22	NA	NA	0.89
Riffle width (percent)	NA	61.9	74.7	72.3	53.8	1.1	58.6	15.2	NA	NA	14.9
Pool width (percent)	NA	38.3	25.3	27.7	46.2	98.9	41.4	84.8	NA	NA	85.1
Pool quality	NA	2.9	2.9	2.7	4.3	5.0	3.8	4.0	NA	NA	4.1
Pool feature	NA	4.8	5.5	1.0	1.0	1.0	7.1	5.3	NA	NA	5.4
Streambanks											
Bank angle (degrees)	NA	110	1.6	77	81	79	77	75	NA	NA	85
Bank undercut (feet)	NA	0.47	0.29	0.38	0.36	0.40	0.48	0.52	NA	NA	0.42
Shore depth (feet)	NA	0.29	0.27	0.35	0.26	0.30	0.48	0.75	NA	NA	0.50
Fisheries rating	NA	2.8	3.4	3.2	3.0	4.3	2.3	3.0	NA	NA	NA
Streambottom											
Total fines (percent)	NA	NA	42.4	31.6	44.8	40.2	38.7	41.1	NA	NA	49.1
Fines <0.03 in. (percent)	NA	NA	30.1	3.5	23.6	23.3	29.3	22.0	NA	NA	33.5
Fines >0.03 in. (percent)	NA	50.6	12.3	28.1	21.2	16.9	9.4	19.1	NA	NA	15.6
Gravel (percent)	NA	31.6	49.5	54.1	39.8	38.5	46.2	43.1	NA	NA	42.0
Rubble (percent)	NA	17.5	6.8	14.4	15.2	20.7	15.0	13.9	NA	NA	8.1
Boulder (percent)	NA	0.3	1.1	0.5	0.2	0.6	0.3	1.9	NA	NA	0.9
Embeddedness (rank)	NA	2.2	2.8	2.6	2.3	2.5	2.5	2.3	NA	NA	1.1
(percent)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	89.7
Instream cover (feet)	NA	NA	NA	2.6	7.0	1.6	1.8	NA	NA	NA	6.2
Riparian											
Stream cover	NA	2.1	1.7	2.1	1.9	2.0	1.9	2.1	NA	NA	2.0
Bank stability (rank)	NA	2.5	2.4	3.5	3.1	2.9	3.5	3.3	NA	NA	3.4
(percent)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	75.0
Habitat type	NA	12.1	13.2	16.7	15.7	15.8	14.9	16.5	NA	NA	14.5
Vegetative use (percent)	NA	69	11	70	48	82	57	1	NA	NA	3
Alteration (percent)											
Natural	NA	24	40	13	13	7	11	12	NA	NA	28
Artificial	NA	21	5	37	10	25	22	13	NA	NA	12
Total	NA	45	45	50	23	32	33	25	NA	NA	40
Vegetative overhang (feet)	NA	0.62	0.55	0.19	0.25	0.30	0.18	0.30	NA	NA	0.25
Canopy (degrees)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Light intensity (percent)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
(x 10^2 ft candles)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

the combination of the discharge of Mace Creek in this site and the presence of a heavily used cattle crossing. Site 2, which contains an area of spring inflows, is the second widest of the three sites.

Bear Valley Creek has always been narrowest and also deepest in site 3, the upstream control site. Average depths fluctuated somewhat more than stream widths over the course of the study, being apparently more responsive to differences in moisture regime. Both low water years of 1977 and 1979 were accompanied by very low average depths, though widths in 1979 were relatively unaffected; the very low widths and depths in 1977 bear witness to the severity of the drought that year. In addition, high water conditions in 1982 were accompanied by a maximum width increase of 12 percent (site 2) but a maximum increase in depth of 45 percent (site 1); in all sites, depth increased by at least 40 percent. In 1985, widths were again fairly low as a consequence of the unusually early spring snowmelt.

During most years and in all study sites, riffle areas comprised the bulk of the water column (Figure 3). Highly anomalous results were recorded in 1979 as a result of overemphasizing the need to classify transition zones (runs or glides) as pool. Large sections of Bear Valley Creek are, in fact, long, medium velocity runs, and a considerable amount of observer judgment is required in segregating the stream into pool or riffle. Consequently, this variable has fluctuated considerably over the course of the study, and must be used with caution. It seems clear, however, that the treatment site (site 2) consistently contained more definite riffle areas and experienced somewhat less fluctuation (appendix 3) than either of the two control sites. No distinct change in this relationship as a result of excluding cattle from site 2 was apparent, but low water conditions in 1985 appeared to restrict riffle more in the treatment site than in the two controls. This may signal the beginning of an improving trend in water column conditions within the exclosure.

Although definite pool and riffle areas were difficult to distinguish, it is clear that pools were abundant and of generally high quality with respect to the habitat needs of salmonid fishes. Any pool quality rating near 4 indicates a pool that is both long relative to the size of stream and about 2 feet deep in at least its deepest portion. The very high ratings of 4.8 and 5.0 recorded in sites 2 and 3, respectively, indicated superb pools of 3 or more feet deep in places. Unfortunately, pool ratings fluctuated with pool width measurements, being relatively lower when the observer recorded lower amounts of pool, because the quality rating was based on maximum pool width. The same reservation in evaluating overall quality that was applied to pool width must therefore be considered.

Bear Valley Creek is, as previously mentioned, composed of extensive areas of very long runs. If these runs are recorded as pool areas, as they should be because of their relatively low velocity, lack of turbulence, and good depth, their quality rating will have automatically been high. It can be argued that many of these runs were

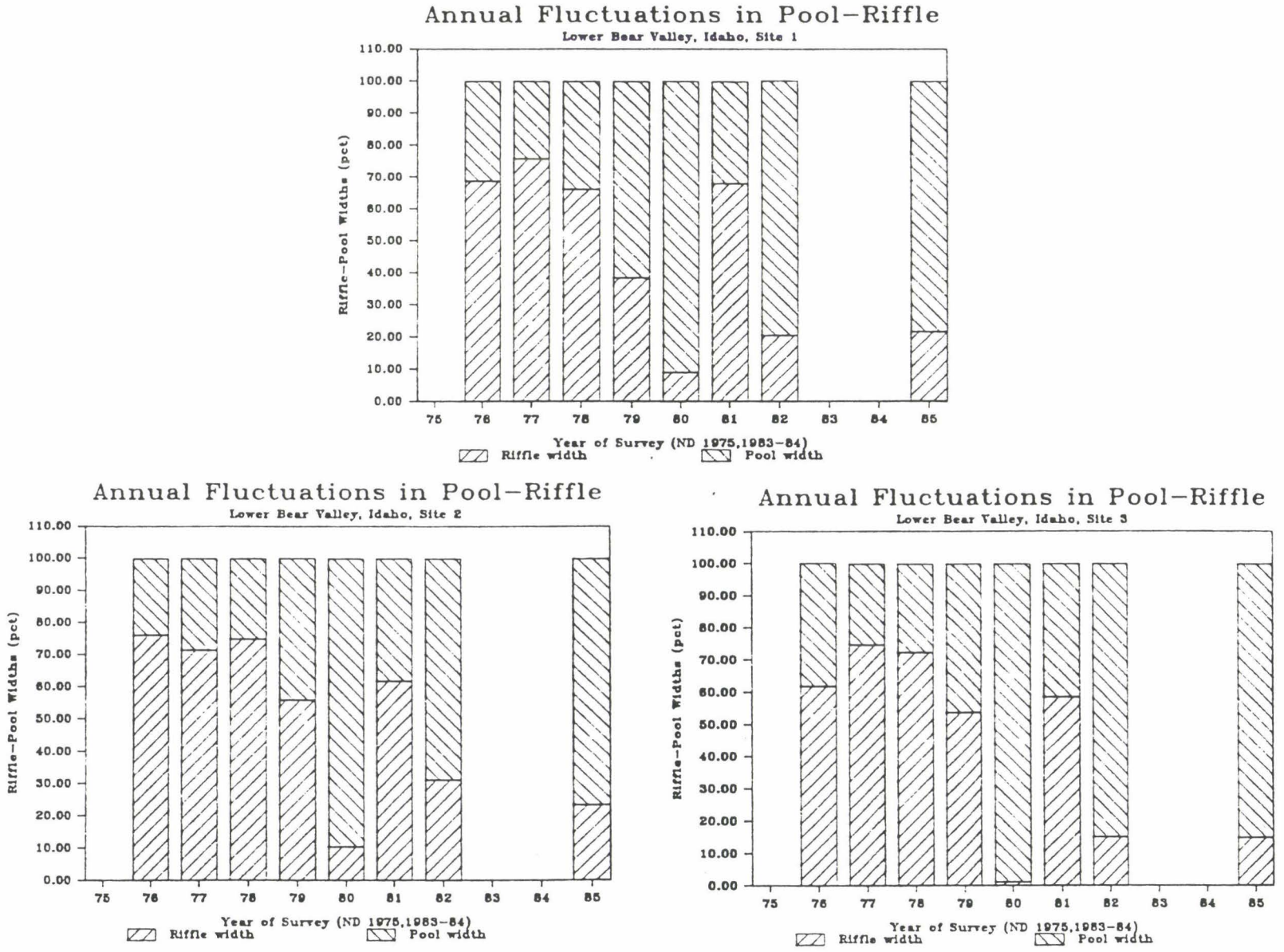


Figure 3. Annual fluctuations in relative abundances of pool and riffle, 1975-1985, Lower Bear Valley, Idaho.

consequently overrated with respect to "pool" quality because only width determined their rating; considerable experience with Bear Valley Creek indicates that the study area is, in fact, graced with an abundance of moderate to high quality pools.

Pool feature represented an attempt to determine the principal sources of origin of pool areas. This measurement has undergone several revisions over the years, and the relationships of the numbers presented in Table 1 to actual sources of origin are somewhat obscure. Basically, since runs are so prevalent on Bear Valley Creek, channel conditions have been the principle pool feature. This is clearly seen in the 1976 and 1977 ratings, which hovered near 5 in all sites. In 1979 and continuing until 1981, all ratings except beaver (9) and nonbeaver (1) were discarded; since beaver are not common in Bear Valley, pool feature was rated at 1 during this period. A modified rating scale of 1, 2, 5, 7, 9 was then adopted in 1981, and feature ratings returned to approximately their previous levels. The original 9-factor scale was used again in 1982, and ratings returned to their original, predominantly channel feature ratings. In 1985, the 5-factor scale used in 1981 was used again; experience with using this system resulted in ratings nearly equal to those of 1982.

Streambank Variables

The highest bank angles, and consequently the shallowest undercuts and streamshore depths, were recorded in ungrazed site 2. In most cases, site 1 took an intermediate position between sites 2 and 3 with respect to these variables. Both of these results are quite easily explained when one considers the gross morphology of the study area. The cattle crossing mentioned previously occurs in site 1, and streambanks in its vicinity are severely outsloped and eroded, and the banks near the springs in site 2 are generally outsloped. In addition, rather than being exclusively a meadow stream in site 2, the creek abuts a talus slope of large unconsolidated granite debris. These boulders provide little undercut and contribute to the high bank angles in site 2, though they were less important in reducing streamshore depth. It is interesting to note, however, that streamshore depths were greatest in site 2 in 1985, and undercut appears to be in a generally increasing trend.

Fisheries rating, of course, reflected the combined effects of these streambank characteristics, and was consequently consistently highest in site 3 while being similar in sites 1 and 2. This rating was somewhat subjective, depending not only on streambank conditions but also on whether the observer considered the water's edge to be pool or riffle, and on how cover conditions other than undercut were rated. Consequently, there was some variation in fisheries rating that was due to observer bias, as well as real variation that was caused by changes in water level and possibly changes in grazing patterns. The apparent slight relative increase in fisheries rating in site 2 and its possible small relative decline in the grazed site 1 may be due at least partially elimination of grazing in site 2 and concentration of cattle near the crossing in site 1. This rating was eliminated in 1983.

Stream Bottom Variables

The greatest fluctuations in surface substrate materials were noted with respect to fine sediments, with some sympathetic fluctuation in the relative abundance of gravel (Figure 4). At the boundaries between these three size classes, it is sometimes difficult to separate them accurately and consistently. Consequently, increases in small fine sediments (<0.03 in.) were generally accompanied by decreases in large fine sediments; similarly, changes in large fine sediments were generally accompanied by some inverse change in gravel abundance. Despite this difficulty, much of the stream bottom of Bear Valley Creek within the study area can be described as quite sandy (up to 64 percent fine sediments and up to 28 percent fines between 0.03 and 0.18 inches), possibly at levels that are limiting to production of anadromous fishes. Rainbow trout, for example, have been shown to prefer spawning beds with fine sediments <= 5 percent of the total surface sediment, and invertebrate prey organisms are best produced at fine sediment levels of less than 10 percent (Raleigh et al. 1984). While it is not clear whether the abundance of fine surface sediments in Bear Valley Creek were derived from individual local land uses, (dredge mining, logging, and livestock grazing) erodibility of streambanks is high (Platts and Nelson in press a). Whether protection of the streambank within the exclosure we have constructed will reduce fine sediments remains to be seen, but evidence to date suggests that small protected areas are largely ineffective with respect to limiting transport of sediments derived from generally degraded watersheds (Platts and Nelson in press b). Relatively large increases in fine sediment in 1985 may well have resulted from high early runoff increasing sediment inputs derived from the dredged areas upstream and the easily eroded banks in the livestock areas.

Gravel and rubble constitute the other two major surface substrate components. These two materials have mostly remained at relatively uniform levels with only minor fluctuations throughout the study. The single real exception to this was an apparent steady decline in the relative abundance of rubble in site 1 from a respectable 33.2 percent in 1976 to only 10.4 percent in 1982. Reasons for this occurrence are unknown, and the loss seems to have been absorbed by all other substrate categories. In 1985, rubble abundance was again up to moderate levels in site 3, though it declined some in site 1. Boulders comprised only a minor proportion of streambed material in this portion of Bear Valley Creek.

As was expected from the high levels of fine sediments, embeddedness ratings were quite low, indicating substantial absolute embeddedness. No trends in embeddedness as a result of experimental treatment could be detected, and annual fluctuations in rating probably resulted from a combination of stream hydraulics and observer inconsistency between years. In 1985, embeddedness was measured in actual percentage, and site 3 was seen to be most embedded; the low rankings in 1985 were calculated from percentages, and are not really comparable to previous ratings.

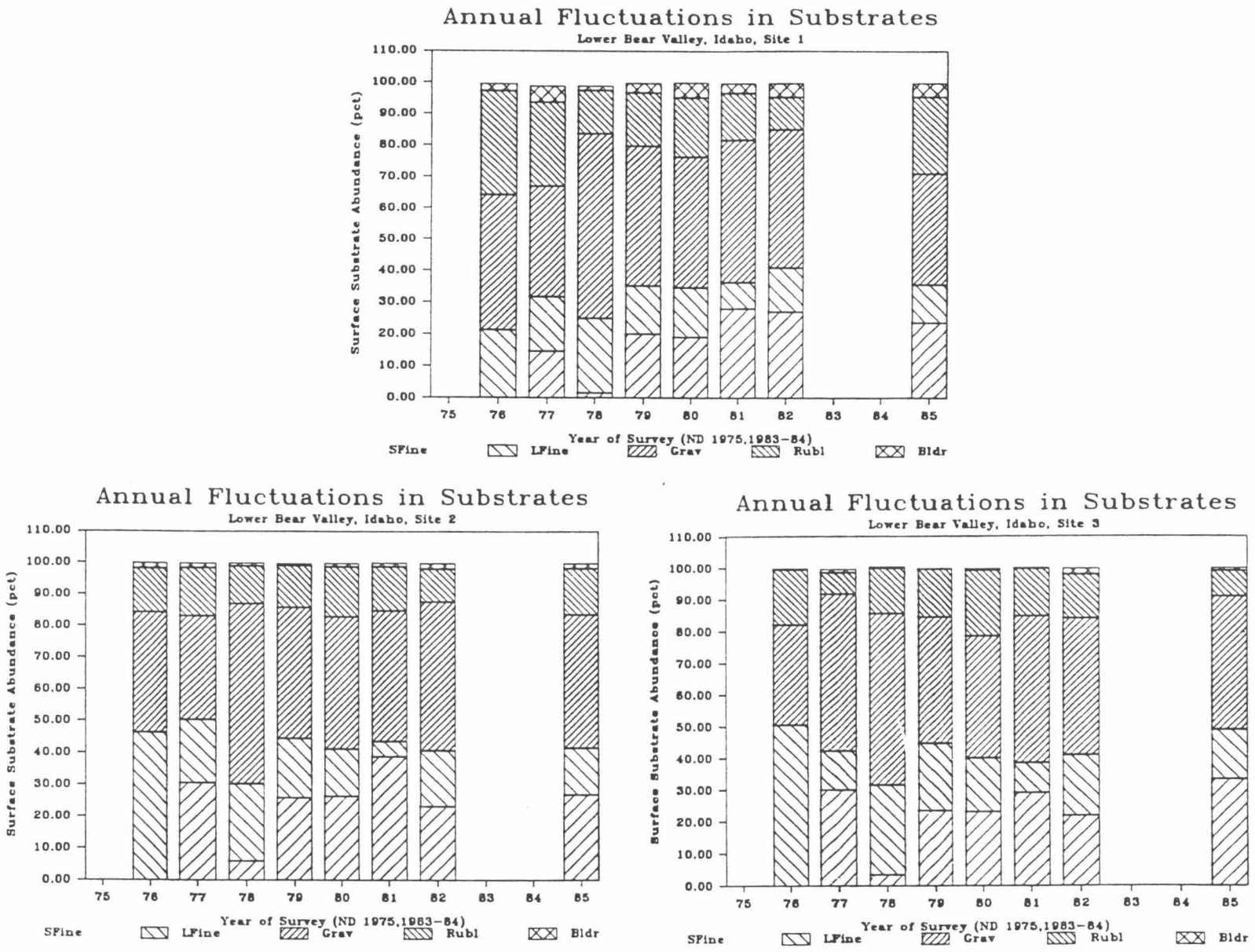


Figure 4. Annual fluctuations in relative abundance of substrate size classes, 1975-1985, Lower Bear Valley, Idaho.

Instream vegetation cover has generally been sparse, usually amounting to less than 8 percent of stream width. Larger amounts were encountered in 1979 and 1985, when coverage as high as 32 percent in 1979 (site 1) and 22 percent in 1985 (site 2). Water levels during these years were fairly low, though not extremely low, but reasons for these large fluctuations in instream cover are unknown.

Riparian Analyses

While these measurements include some of our most subjective evaluations, they are very important in helping to reveal trends in the vegetational structure of the streamside corridor. Rest-rotation grazing, which is practiced along Bear Valley Creek, implies that streambanks will be grazed some years and not in others. This encourages differences in vegetation conditions that may only be apparent, necessitating a good measure of caution. In many cases, annual fluctuations were apparently large (Table 1), but the extended time frame allows some separation of the influences of bias and reality.

No definite trends were clearly visible in stream cover, though conditions do seem to have become somewhat more exposed in site 1 (i.e. the rating moved closer to "1"). Examination of vegetation use levels suggests that site 1 was exceptionally heavily impacted during the course of the study, some of which may have been due to concentration of cattle around the site 1 stream crossing traditionally used by cattle; however, six consecutive seasons of grazing pressure, four of which were => 70 percent seems excessive for a rest-rotation system[4/]. Neither of the other two sites received such heavy use, and cover in them has undergone wider apparent fluctuations, but has probably remained essentially constant. Clearly, heavy use in site 1 made this site easier to evaluate.

Bank cover stability rated the ability of the banks to resist erosion due either to vegetative cover or the presence of large inorganic material. On Bear Valley Creek, stability is gained chiefly by vegetation, and the values recorded in the 2.4 to 3.5 range indicate good but not high resistance to erosion. Clearly, site 3 was consistently the most stable, with sites 1 and 2 having been similar throughout most of the study. It appears, however, that protection from livestock use is beginning to result in a gradual increase in stability within the exclosure (site 2). This trend was somewhat masked in 1985 because of the rest cycle in the sheeptrail pasture and corresponding vegetal response in all three study sites.

Habitat type rating was an attempt to evaluate the dominant and subdominant constituents of the streambanks based on their value to salmonid fishes. It is a rather subjective rating, but it nevertheless provides some information about the character of streambank habitat and possible trends. Inspection of Table 1 suggests that habitat type (i.e. value to salmonids) in site 1 may be fluctuating somewhat but remaining

---

4/ For additional information on this subject, refer to USDA (1980).

relatively constant from a fisheries perspective. In contrast, conditions seem to be entering a downward trend in site 3 and possibly a slight upward trend in site 2.

Streamside use levels during "grazed" years were consistently above 70 percent in site 1, and, though generally lower in site 3, have been as high as 82 percent. Rest-rotation grazing supposedly allows at least one period of rest in each 3-year cycle, but this did not occur in the period from 1977 through 1982. With completion of the livestock exclosure in 1979, use therein was largely curtailed; however, considerable inadvertent use occurred in 1980, possibly helping to account for the tardiness with which rehabilitative trends are beginning to appear in site 2.

Streambank alteration levels were also quite high. Trends in these variables will need more time to become clear because of their relatively high inherent subjectivity. As suggested previously, however, there does seem to have been a trend toward reduction in site 2 and increase in site 1. Alteration in all sites increased in 1985, however, probably as a result of unusually high erosion in the spring flood period; almost all the increase was attributed to natural means.

Overhanging vegetal cover existed in the Lower Bear Valley study area, but was never very abundant. Much of what cover did exist was also marginal, consisting largely of emergent or bank-rooted sedges rather than overhanging brush. On the positive side, however, overhang in site 2 does seem to be increasing relative to overhang in the two control sites, and actually declining in control site 1. Absolute changes in the amount of overhanging plant cover are less clear because of inter-year fluctuations.

The canopy cover and light intensity evaluations are inconclusive at best. The high canopy angle indicates a general lack of topographic or vegetational structures to shade the stream, suggesting the likelihood of excess insolation. In addition, evaluation of thermal input with the Solar Pathfinder™ revealed little difference between sites with respect to thermal loading (Table 6). Annual thermal regimes were also similar (Figure 5).

Table 6.--Average thermal input in Lower Bear Valley by site.

Variable	Study Site		
	Site 1	Site 2	Site 3
Average Input (BTU/ft^2/day)	1459	1476	1483
July Input (BTU/ft^2/day)	2604	2643	2663

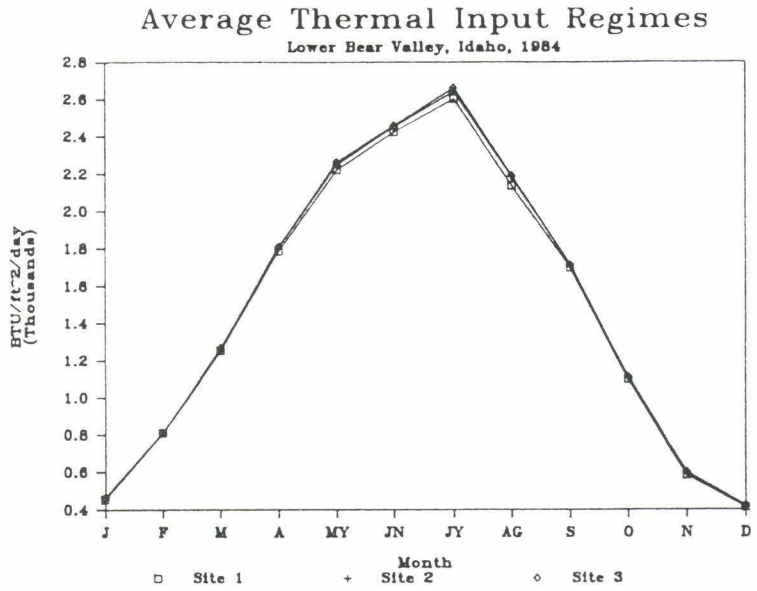


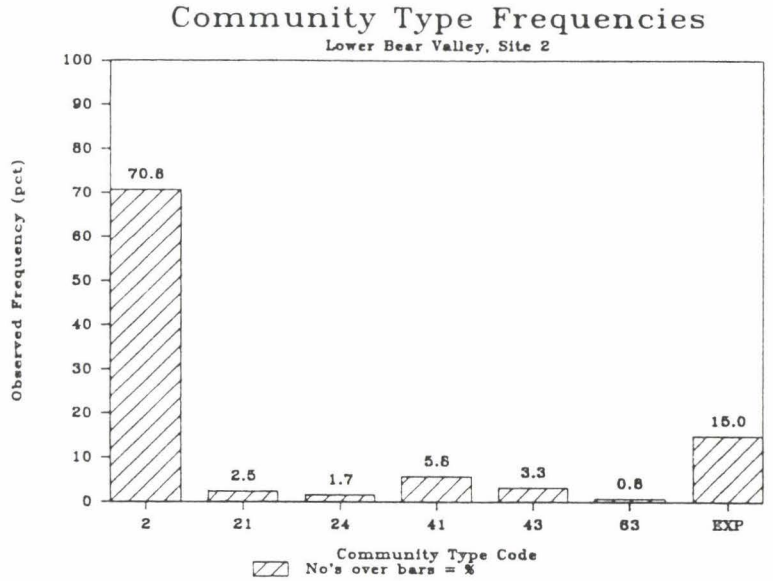
Figure 5. Average thermal input regimes by study site, Lower Bear Valley, Idaho.

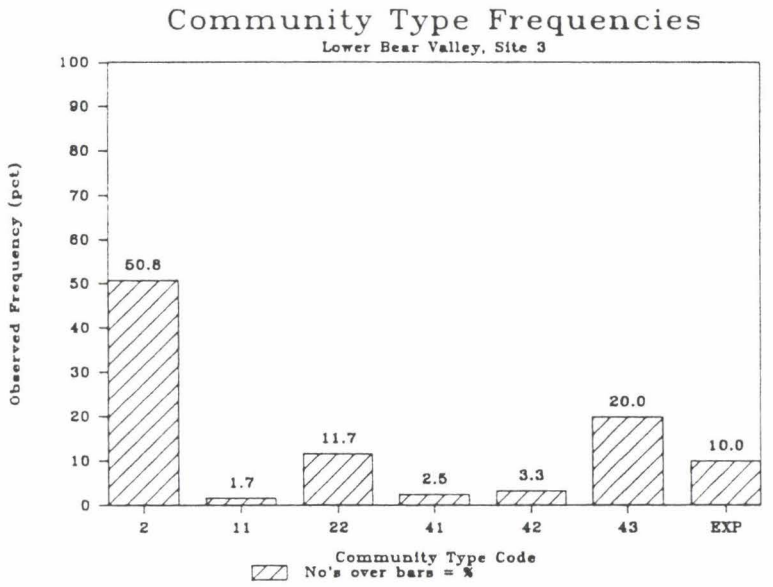
Riparian Community Classification

All three study sites were dominated by a single riparian community type (CT); CAAQ (Carex aquatilis) (Figure 6). This CT has not been clearly defined in previous classification efforts, but is similar to the CARO CT, which contains less then 15 percent willow and more than 30 percent C. rostrata and/or C. aquatilis; other Carex species may also be present (Jensen and Tuhy 1982). C. aquatilis is highly palatable to cattle (Hermann 1970), but its tendency to grow in saturated soils tends to limit its use (Hermann 1970; Jensen and Tuhy 1982; Platts and Nelson in press).

The CAAQ type was least abundant in site 3, where it was replaced by a higher frequency of grass and willow CT's. Site 3 is apparently a more xeric (less wet) study site, as evidenced by greater prevalence of the DECE and SAWO communities. Both of these CT's are highly susceptible to grazing pressure (Jensen and Tuhy 1982), and in DECE there is real potential for serious erosion in grazed streamside positions.

Nonvegetal CT's were modestly abundant, and most prevalent in site 2. Much of this is due to a large talus slope in the site. A cattle crossing is located in site 1, which may account for the intermediate level of exposed CT's there.





Key to Community Types:

Code	Description
002	CAAQ
011	ELPAU
021	CACA
022	DECE
024	Mesic Graminoid Meadow
041	SAWO-BEGL/CARO-CAAQ
042	SAWO/SWPE-PEGR
043	SAWO-SAEA/Mesic Herb
063	SAGE/CACA
EXP	Misc. Non-vegetal CT's

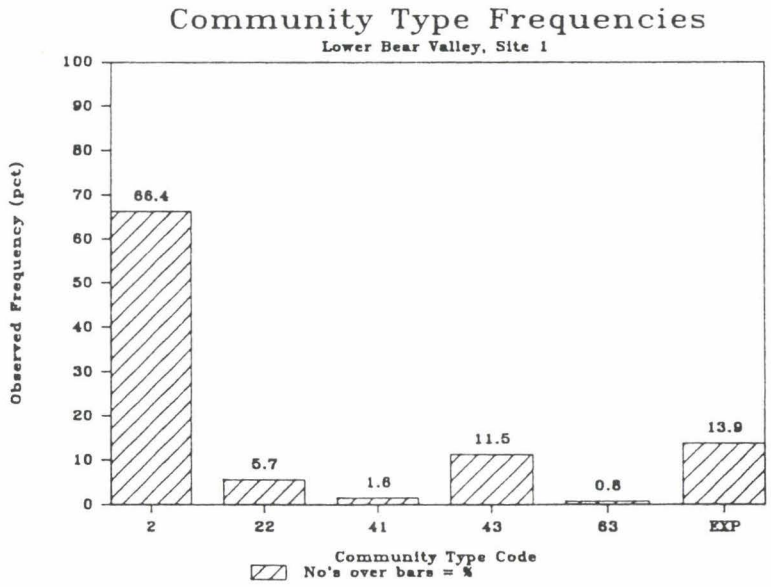


Figure 6. Riparian community type frequencies by study site, Lower Bear Valley, Idaho (1983 data).

Streamside Herbage Analyses

Streamside forage biomass and yield differential between study sites 2 (potential production) and 1 (potential less harvested forage) has been performed on Lower Bear Valley each year since 1979 (Table 7). Statistical results were generally better than reported in the literature for nonriparian vegetation (Neal et al. 1976), and, except for the marginal results in 1979 (the first year of application), demonstrate the statistical suitability of applying electronic capacitance meter analyses to riparian situations.

Standing biomass (production) differences between sites 2 (ungrazed, potential production) and 1 (grazed, yield after harvest) were used to estimate percent use by cattle in site 1, and to compare estimates derived electronically and visually (Table 8). The 7 percent discrepancy between sties in the ungrazed year 1985 represents an inherent productivity difference similar to that observed in 1982; however, the latter was greater due probably to the high overall productivity in 1982.

Fish Population Analyses

Fish populations in Bear Valley Creek consist of native anadromous chinook salmon and steelhead trout, and native and exotic stocks of other salmonid species, including rainbow trout, Eastern brook trout, bull trout, and whitefish. The only nongame fish encountered was sculpin, though there were conceivably more than one species present[5/]. Results of 5 years of fish population sampling in the Lower Bear Valley study area are summarized in Table 9.

In general, salmonid fish populations were not high. Prior to 1980, chinook salmon were generally the most abundant species, though brook trout had this honor in 1978 and 1980 (Figure 7)[6/]. Bear Valley Creek has historically been an important nursery stream for chinook salmon, and it is unfortunate that their presence seems to be on the wane. Spawners were never included in our surveys, but prior to 1979 they were regularly encountered by field crews; none have been seen since 1979. Populations of salmon fry were observed to fluctuate considerably during the study period, from a very low level in 1980 to a considerable presence in 1979. Actual numbers of individuals present,

---

[5/] A cursory evaluation of the sculpin species potentially present in Bear Valley Creek can be found in: Primbs, E. R. G., and W. S. Platts (1976).

[6/] A two pass depletion model, which is excessively sensitive to removal pattern, was used in 1976; the very large population estimate for chinook in site 1 for 1976 is probably exaggerated. Additional insight into real population conditions can be gained by inspecting the proportional histograms in appendix 3.

Table 7.--Streamside herbage analysis results, Lower Bear Valley, Idaho, 1979-1984.

	Statistics									Production			
			Metric			English		Undimensioned		Site 1		Site 2	
Year	a	b	S(y.x)	a	b	S(y.x)	n	R	R^2	lb/ac	kg/ha	lb/ac	kg/ha
1979	-0.10	0.06	0.56	-2.79	1.83	15.81	16	0.76	0.57	1081	1213	1457	1635
1980	-0.06	0.08	0.45	-1.66	2.21	12.64	14	0.89	0.79	933	1047	1957	2196
1981	0.26	0.07	0.44	7.33	2.10	12.48	15	0.88	0.77	1180	1324	1263	1417
1982	-0.18	0.06	0.49	-5.06	1.67	13.87	16	0.94	0.89	2600	2917	3469	3892
1983	-0.48	0.06	0.38	-13.57	1.78	10.82	16	0.95	0.91	959	1076	2544	2854
1984	-0.03	0.06	0.52	-0.91	1.59	14.79	18	0.71	0.51	1213	1362	1724	1935
1985	0.58	0.01	0.35	16.54	0.30	10.02	18	0.89	0.80	1422	1596	1537	1725

Table 8.--Forage yield differentials and visual estimate of vegetation use, Lower Bear Valley, site 1.

Year	Differential (pct)	Use (pct)
1976	ND[1/]	75
1977	ND	76
1978	ND	70
1979	26	17
1980	52	77
1981	7	63
1982	25	0
1983	62	ND
1984	29	ND
1985	8	1

[1/] ND - No data.

Table 9 --Summary of annual fish population analysis results, Lower Bear Valley, Idaho (1976-1980).

Species/Variable	Site 1					Site 2					Site 3				
	1976	1977	1978	1979	1980	1976	1977	1978	1979	1980	1976	1977	1978	1979	1980
Chinook salmon															
Total catch (#)	38	36	8	302	12	14	22	26	293	23	69	36	7	171	7
Population estimate (#)	48	36	8	317	12	20	22	26	305	23	431	36	7	182	7
Mean length (in)	NA	NA	NA	2.49	4.35	2.39	3.45	NA	2.76	4.20	2.67	NA	3.10	NA	4.17
(mm)	NA	NA	NA	63.1	110.7	60.8	87.6	NA	70.2	106.8	67.9	NA	78.7	NA	105.9
Mean weight (oz)	NA	NA	NA	0.10	0.74	0.09	0.35	NA	0.10	0.60	0.14	NA	0.18	NA	0.52
(gm)	NA	NA	NA	2.8	21.1	2.6	9.9	NA	3.8	17.1	4.0	NA	5.0	NA	14.6
Estimated biomass															
(oz/ft^2)	NA	NA	NA	0.001	<0.001	<0.001	0.001	NA	0.002	0.001	0.003	NA	<0.001	NA	<0.001
(oz/ft^3)	NA	NA	NA	0.001	<0.001	<0.001	0.001	NA	0.003	0.001	0.0004	NA	<0.001	NA	<0.001
(gm/m^2)	NA	NA	NA	0.453	0.127	0.029	0.164	NA	0.649	0.222	0.960	NA	0.019	NA	0.059
(gm/m^3)	NA	NA	NA	2.186	0.571	0.120	0.769	NA	3.042	0.971	3.705	NA	0.069	NA	0.245
Estimated standing crop															
($\#/ft^2$)	0.002	0.002	<0.001	0.015	0.001	0.001	0.002	0.001	0.016	0.001	0.022	0.003	<0.001	0.010	<0.001
($\#/ft^3$)	0.003	0.004	<0.001	0.022	0.001	0.001	0.002	0.001	0.023	0.002	0.027	0.005	<0.001	0.012	<0.001
(#/mi)	422	317	70	2790	106	176	194	229	2684	202	3793	317	62	1602	62
($\#/m^2$)	0.024	0.027	0.017	0.162	0.006	0.011	0.017	0.083	0.172	0.013	0.242	0.013	0.019	0.106	0.004
($\#/m^3$)	0.094	0.156	0.071	0.780	0.027	0.046	0.078	0.314	0.807	0.057	0.937	0.161	0.069	0.428	0.017
(#/km)	263	197	44	1734	66	109	120	142	1668	126	2357	197	38	995	38
Rainbow trout															
Total catch (#)	46	11	2	60	13	7	2	2	27	19	24	2	1	17	17
Population estimate (#)	48	11	2	65	15	8	2	2	17	28	26	2	1	17	17
Mean length (in)	NA	5.14	6.10	2.07	3.10	2.91	5	5.02	2.83	3.12	3.28	3.76	6.38	NA	3.85
(mm)	NA	130.6	155.0	52.7	78.7	74.0	127.0	127.5	71.9	79.3	83.3	95.5	162.0	NA	97.8
Mean weight (oz)	NA	1.24	1.51	0.14	0.23	0.16	1.16	0.75	0.22	0.29	0.28	0.27	1.66	NA	0.38
(gm)	NA	35.2	42.8	4.0	6.4	4.6	32.8	21.4	6.3	8.2	8.0	7.8	47.0	NA	10.8
Estimated biomass															
(oz/ft^2)	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
(oz/ft^3)	NA	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
(gm/m^2)	NA	0.288	0.041	0.133	0.048	0.02	0.049	0.022	0.133	0.13	0.166	0.013	<0.00	10.097	0.104
(gm/m^3)	NA	1.658	0.168	0.642	0.216	0.083	0.230	0.083	0.623	0.569	0.641	0.068	0.000	0.393	0.447
Estimated standing crop															
($\#/ft^2$)	0.002	0.001	<0.001	0.003	0.001	<0.001	<0.001	<0.001	0.001	0.001	0.001	<0.001	<0.001	0.001	0.001
($\#/ft^3$)	0.003	0.001	<0.001	0.005	0.001	<0.001	<0.001	<0.001	0.002	0.002	0.002	<0.001	<0.001	0.001	0.001
(#/mi)	422	97	97	18	572	0	70	18	18	150	0	229	18	9	150
($\#/m^2$)	0.024	0.008	0.001	0.033	0.008	0.004	0.002	0.022	0.015	0.016	0.015	0.002	<0.00	10.01	0.01
($\#/m^3$)	0.094	0.048	0.004	0.16	0.034	0.018	0.007	0.004	0.071	0.069	0.057	0.009	<0.001	0.04	0.041
(#/km)	263	60	60	11	356	0	44	11	11	93	0	142	11	5	93

NA = not available

Table 9. (Cont.)

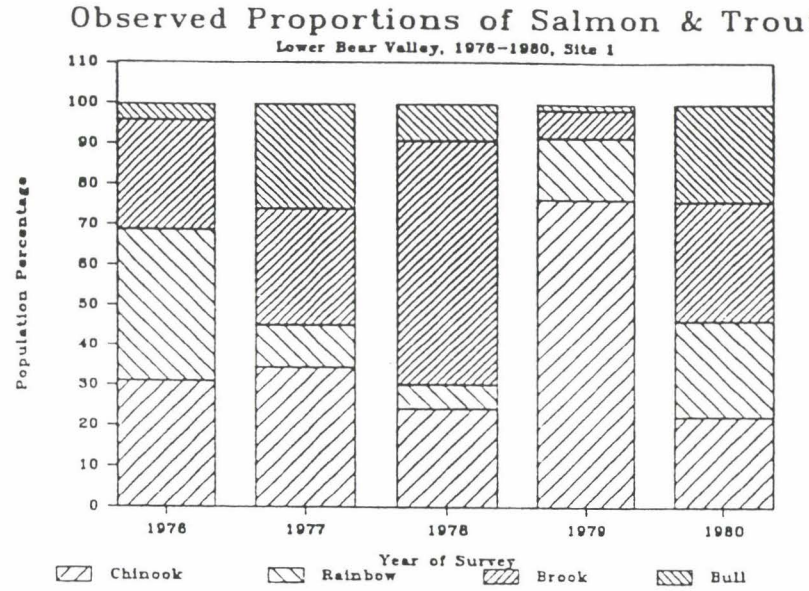
Species/Variable	Site 1					Site 2					Site 3				
	1976	1977	1978	1979	1980	1976	1977	1978	1979	1980	1976	1977	1978	1979	1980
Eastern brook trout															
Total catch (#)	33	30	20	27	16	6	32	41	42	46	20	31	27	33	27
Population estimate (#)	34	30	20	27	16	7	32	41	42	48	20	31	27	33	28
Mean length (in)	NA	4.42	NA	3.59	3.69	NA	4.59	3.35	4.22	4.14	NA	NA	NA	4.44	2.93
(mm)	NA	112.3	NA	91.2	93.8	NA	116.6	85.2	107.1	105.2	NA	NA	NA	112.8	74.4
Mean weight (oz)	NA	0.95	NA	0.53	0.57	NA	1.35	0.51	0.83	1.04	NA	NA	NA	0.78	0.26
(gm)	NA	26.9	NA	15.1	16.3	NA	38.4	14.4	23.7	29.4	NA	NA	NA	22.1	7.5
Estimated biomass															
(oz/ft^2)	NA	0.002	NA	0.001	<0.001	NA	0.003	0.001	0.002	0.003	NA	NA	NA	0.001	<0.001
(oz/ft^3)	NA	0.004	NA	0.001	<0.001	NA	0.004	0.001	0.003	0.004	NA	NA	NA	0.001	<0.001
(gm/m^2)	NA	0.602	NA	0.209	0.131	NA	0.924	0.308	0.561	0.797	NA	NA	NA	0.424	0.122
(gm/m^3)	NA	3.465	NA	1.008	0.589	NA	4.331	1.161	2.629	3.486	NA	NA	NA	1.717	0.507
Estimated standing crop															
($\#/ft^2$)	0.002	0.002	0.001	0.001	0.001	0.002	0.002	0.002	0.002	0.003	0.001	0.002	0.001	0.001	0.002
($\#/ft^3$)	0.003	0.004	0.001	0.002	0.001	0.002	0.003	0.002	0.003	0.003	0.001	0.004	0.002	0.002	0.002
(#/mi)	229	264	176	238	141	62	282	361	370	422	176	273	238	290	246
($\#/m^2$)	0.024	0.022	0.010	0.014	0.008	0.017	0.024	0.021	0.024	0.027	0.011	0.027	0.015	0.019	0.016
($\#/m^3$)	0.094	0.130	0.039	0.066	0.036	0.067	0.114	0.081	0.011	0.119	0.043	0.139	0.053	0.078	0.067
(#/km)	186	164	109	148	88	38	175	224	230	263	109	170	148	180	153
Bull trout															
Total catch (#)	5	27	3	6	13	8	17	3	6	6	5	21	0	0	1
Population estimate (#)	8	29	3	6	13	12	17	3	6	6	5	21	0	0	1
Mean length (in)	3.11	2.66	NA	4.07	NA	2.58	2.27	5.59	4.91	2.68	2.29	2.12	NA	NA	5.87
(mm)	79.0	67.6	NA	103.3	NA	65.6	57.7	142.0	124.8	68.0	58.2	53.8	NA	NA	149.0
Mean weight (oz)	0.29	0.24	NA	0.55	NA	0.16	0.13	0.87	0.96	0.18	0.09	0.13	NA	NA	0.96
(gm)	8.2	6.9	NA	15.7	NA	4.7	3.7	24.5	27.1	5.1	2.6	3.7	NA	NA	27.1
Estimated biomass															
(oz/ft^2)	<0.001	0.001	NA	<0.001	NA	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	0.001	NA	NA	<0.001
(oz/ft^3)	<0.001	0.002	NA	<0.001	NA	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	0.002	NA	NA	<0.001
(gm/m^2)	0.032	0.319	NA	0.048	NA	0.031	0.164	0.038	0.092	0.017	0.007	0.229	NA	NA	<0.001
(gm/m^3)	0.128	1.836	NA	0.232	NA	0.129	0.769	0.143	0.143	0.074	0.027	1.193	NA	NA	<0.001
Estimated standing crop															
($\#/ft^2$)	<0.001	0.002	<0.001	<0.001	0.001	0.001	0.002	<0.001	<0.001	<0.001	<0.001	0.003	NA	NA	<0.001
($\#/ft^3$)	<0.001	0.004	<0.001	<0.001	0.001	0.001	0.002	<0.001	<0.001	<0.001	<0.001	0.005	NA	NA	<0.001
(#/mi)	70	255	16	53	114	106	150	26	53	53	44	185	NA	NA	9
($\#/m^2$)	0.004	0.027	0.001	0.003	0.007	0.007	0.017	0.002	0.003	0.003	0.003	0.031	NA	NA	<0.001
($\#/m^3$)	0.016	0.156	0.006	0.015	0.031	0.028	0.078	0.006	0.016	0.015	0.011	0.161	NA	NA	<0.001
(#/km)	44	159	16	33	71	66	93	16	33	33	27	115	NA	NA	5

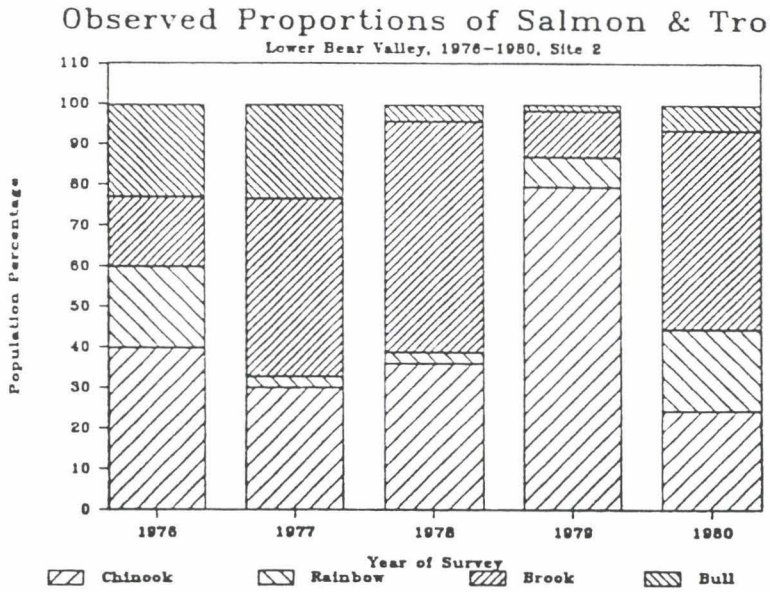
NA = not available

Table 9. (Cont.)

Species/Variable	Site 1					Site 2					Site 3				
	1976	1977	1978	1979	1980	1976	1977	1978	1979	1980	1976	1977	1978	1979	1980
Whitefish															
Total catch (#)	4	51	19	71	27	4	9	36	49	47	3	60	12	18	8
Population estimate (#)	4	61	19	75	32	4	9	36	51	68	3	65	12	22	23
Mean length (in)	1.82	2.23	2.27	2.15	3.63	2.93	2.1	2.59	2.36	2.87	5.63	2.27	4.10	3.19	4.86
(mm)	46.3	56.7	57.6	54.5	92.3	74.5	53.2	65.8	60.0	73.0	143.0	57.7	104.3	80.9	123.4
Mean weight (oz)	0.02	0.09	0.11	0.07	0.85	0.16	0.06	0.07	0.08	0.41	3.09	0.13	1.50	0.20	1.66
(gm)	0.6	2.6	3.0	2.1	24.0	4.7	1.6	2.1	2.4	11.6	86.6	3.7	42.5	5.7	47.0
Estimated biomass															
(oz/ft^2)	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	0.001	0.001	<0.001	0.002
(oz/ft^3)	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	0.001	<0.001	0.002	0.001	<0.001	0.003
(gm/m^2)	0.001	0.118	0.027	0.081	0.016	0.001	0.011	0.039	0.069	0.446	0.146	0.207	0.277	0.073	0.626
(gm/m^3)	0.004	0.679	0.111	0.391	0.072	0.004	0.052	0.147	0.323	1.951	0.564	1.078	0.999	0.296	2.600
Estimated standing crop															
($\#/ft^2$)	<0.001	0.004	0.001	0.004	0.001	<0.001	0.001	0.002	0.003	0.004	<0.001	0.005	0.001	0.001	0.001
($\#/ft^3$)	<0.001	0.007	0.001	0.022	0.001	<0.001	0.001	0.169	0.462	0.002	<0.001	0.008	0.001	0.001	0.001
($\#/mi^2$)	35	537	167	660	282	35	79	317	449	598	26	572	106	194	202
($\#/m^2$)	0.002	0.0045	0.009	0.038	0.016	0.002	0.007	0.019	0.029	0.038	0.002	0.207	0.007	0.013	0.013
($\#/m^3$)	0.008	0.259	0.037	0.183	0.072	0.008	0.033	0.072	0.136	0.166	0.008	1.078	0.025	0.053	0.054
(#/km)	22	334	104	410	175	22	49	197	279	372	16	356	66	120	126
Sculpin															
Total catch (#)	474	1487	1906	1118	1450	310	1417	1649	1320	2024	390	1342	2080	1082	1936
Population estimate (#)	585	1824	2026	1270	1873	630	1490	1700	1471	2024	451	1680	2100	1152	2191
Mean length (in)	2.16	NA	NA	NA	NA	2.28	NA	NA	NA	NA	2.38	NA	NA	NA	NA
(mm)	54.8	NA	NA	NA	NA	57.9	NA	NA	NA	NA	60.5	NA	NA	NA	NA
Mean weight (oz)	0.13	0.06	0.05	0.06	NA	0.11	0.05	0.05	0.07	NA	0.13	0.05	0.06	0.08	NA
(gm)	3.8	1.8	1.5	1.8	NA	3.3	1.5	1.4	1.9	NA	3.8	1.6	1.7	2.3	NA
Estimated biomass															
(oz/ft^2)	0.003	0.008	0.005	0.004	NA	0.004	0.005	0.004	0.005	NA	0.003	0.007	0.006	0.055	NA
(oz/ft^3)	0.004	0.014	0.006	0.006	NA	0.005	0.007	0.005	0.007	NA	0.004	0.011	0.007	0.068	NA
(gm/m^2)	1.093	3.444	1.458	1.172	NA	1.148	1.678	1.238	1.577	NA	0.965	2.318	1.941	1.429	NA
(gm/m^3)	4.373	14.067	5.979	5.655	NA	4.768	7.865	4.669	7.391	NA	3.721	12.071	6.998	5.788	NA
Estimated standing crop															
($\#/ft^2$)	0.027	0.126	0.090	0.060	0.087	0.032	0.104	0.082	0.077	0.106	0.024	0.135	0.106	0.066	0.118
($\#/ft^3$)	0.033	0.221	0.113	0.088	0.119	0.041	0.149	0.094	0.110	0.141	0.028	0.214	0.116	0.081	0.149
($\#/mi^2$)	5148	16051	17829	11176	16482	5544	13112	14960	12945	17811	3969	14784	18480	10138	19281
($\#/m^2$)	0.288	1.358	0.972	0.651	0.939	0.348	1.678	0.884	0.83	1.145	0.254	1.449	1.142	0.714	1.268
($\#/m^3$)	1.152	7.816	3.986	3.141	4.220	1.445	7.865	3.334	3.890	5.009	0.980	7.546	4.117	2.892	5.266
(#/km)	3200	9976	11081	6946	10244	3446	8149	9298	8045	11070	2467	9188	11485	6301	11983

NA = not available





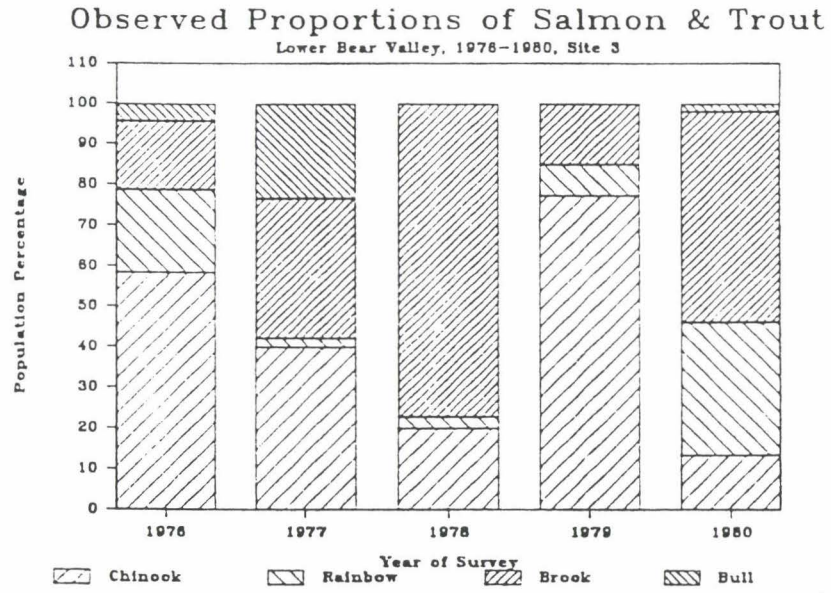


Figure 7. Observed relative abundances of game fish species in Lower Bear Valley by site, 1976-1980.

in fact, is a somewhat misleading statistic, and it appears from inspection of average sizes that most of the salmon present in the poor years of 1978 and 1980 were residuals ("precocious males") and not fry.

Rainbow trout (steelhead and resident) have generally comprised a rather minor element in the overall population, though they were relatively abundant in 1976 and 1979. Both of these years were also highly productive with respect to chinook salmon; in fact, rainbow trout and chinook generally followed similar population patterns. Interestingly, both species were least abundant in site 2 for the first years of the study, but most abundant in site 2 in 1979 and 1980. Whether this is due to completion of the livestock exclosure in 1979 is not known, but the possibility should not be overlooked.

Brook trout and bull trout presented something of a problem during the study. They are taxonomically very similar species and appear to hybridize freely in Bear Valley Creek. This created some problems in identification with respect to both juveniles and adults, so the numbers for each species as reported here should not be considered absolutes. Both species were generally well-represented, though brook trout were by far the more common, and the abundance of bull trout may be on the decline. It is possible that competition between the native bull trout and the exotic brook trout is partly responsible, or it may be that the generally degraded conditions of Bear Valley Creek are less suited to bull trout. Whatever the case, current conditions seem to be most favorable to the production of brook trout, though even they are not as abundant as could be desired from a recreational angling perspective.

Another, often maligned, salmonid that is native to Bear Valley Creek is the mountain whitefish. Although never tremendously abundant, they have constituted a steady presence with respect to both fry and adults, and seem to be in no immediate danger of disappearing from the system.

Sculpin were, of course, the most abundant fish encountered during the study, and were usually dominant with respect to both numbers (Figure 8) and biomass. While frequently considered undesireable, their abundance does suggest that stream bottom substrate conditions are not degraded to the point that they are completely inimical to trout and salmon production. Resident trout could use sculpin for food; a dead bull trout no more than 6 inches long was once collected, its obvious cause of death being that it tried to eat too large a sculpin and "choked" to death. No trends in study site preferences of sculpin could be detected.

Hydrologic Analysis

Hydrologic data were collected on Lower Bear Valley from 1976 through 1979 (Table 10). Results show Bear Valley Creek within the lower study area to be of very low gradient, with water surface slope never exceeding 0.30 percent; variations in surface slope probably resulted from variations in streamflow as well as some improvement in analytical precisions over the study period. Velocities and flows were quite variable between years, and were very low during the dry year

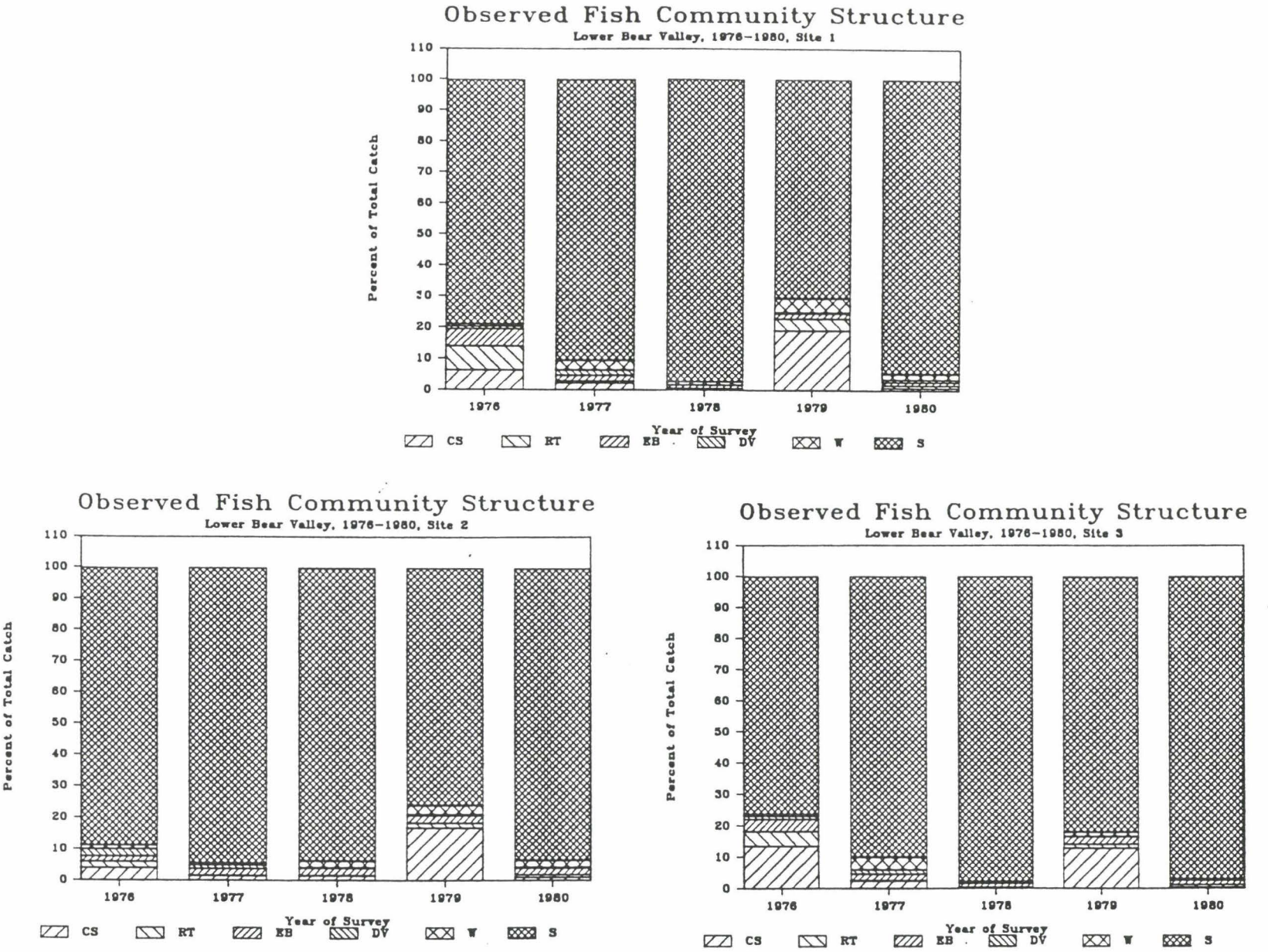


Figure 8. Observed relative abundances of all fish species, 1976-1980, Lower Bear Valley, Idaho (cross-hatched block is sculpin, bottom block is Chinook salmon).

Table 10.--Summary of annual hydrologic variable means, Lower Bear Valley, Idaho, 1976-1979.

Variable	Site 1				Site 2				Site 3			
	1977	1977	1978	1979	1976	1977	1978	1979	1976	1977	1978	1979
Slope (pct)	0.12	0.30	0.25	0.21	0.16	0.04	0.06	0.17	0.08	0.05	0.17	0.08
Wetted area (ft^3)	33.3	18.7	36.3	23.7	29.9	23.0	36.8	28.4	35.7	22.2	28.3	28.2
Wetted perimeter (ft)	38.0	34.5	41.2	38.5	35.4	24.7	31.9	28.1	34.4	25.3	29.5	32.0
Wetted width (ft)	37.3	33.8	38.3	37.2	34.3	23.9	30.2	26.4	33.3	24.6	28.4	30.7
Wetted depth (ft)	0.88	0.56	0.94	0.63	0.85	0.97	1.22	1.08	1.02	0.90	1.00	0.91
Wetted hydraulic radius	0.86	0.55	0.90	0.61	0.82	0.93	1.16	1.02	0.98	0.88	0.96	0.87
Wetted flow (ft^3/sec)	20.8	12.2	47.0	21.0	27.1	9.5	34.9	21.2	30.8	9.4	28.4	21.8
Wetted velocity (ft/sec)	0.74	0.67	1.35	0.93	1.00	0.43	0.94	0.76	1.06	0.44	1.03	0.82
Stream power	0.05	0.07	0.20	0.08	0.10	0.01	0.04	0.09	0.06	0.01	0.19	0.03
Manning n	0.12	0.09	0.06	0.05	0.05	0.07	0.04	0.08	0.03	0.07	0.06	0.05

1977. Velocities and flows also varied between sites, with site 1, the widest site, having the highest velocities. Variation in flow between sites illustrates the danger of taking flows measurements at only a single location.

Upper Bear Valley

Geomorphic/Aquatic Analyses

The Upper Bear Valley study area is located about 1 mile above the lower study area, and is considerably different in structure. Sampling on this upper study area began earlier than on the lower study area, but because of its nearness to the Lowman-Stanley road and the fact that it is bisected by a fenceline separating two grazing pastures, this area has been given lower priority status than the lower study area. Structural and riparian analysis results are summarized in Table 11.

Water Column Variables

By and large, stream width in Upper Bear Valley was less uniform from year to year than in the lower study area. Effects of excess streamflow in 1977 were readily apparent from large increases in width in all three sites (Table 11). Even average depths did not vary much on an annual basis until 1982 when depth jumped about 20 percent in each site; taking average width and depth together for 1982, there was clearly considerably more water in Bear Valley Creek than at any other time during the study. Width, in fact, approached the 1977 high in each site. Because of little actual elapsed time from completion of the livestock exclosure in 1979 until we ceased collecting structural data in 1982, and because of annual fluctuations in streamflow, no definite effects of rest from grazing on stream width or depth can be detected at this time, though site 2 does seem to be decreasing in width relative to the two control sites. It is interesting to note that low water conditions in 1985 reduced widths only in sites 1 and 2; widths actually increased in site 3.

Most of the fluctuations in relative amounts of riffle and pool (Figure 9) can be attributed to the same causes of fluctuations in Lower Bear Valley. There was some difficulty characterizing runs as either pool or riffle, causing a certain amount of apparent change from year to year. It does appear that the treatment site had an inherently greater proportion of pool and/or high quality runs than either site 1 or 3; however, no evidence that protection from grazing is increasing this difference is available at this time.

In addition to having the greatest proportion of pool areas, site 2 generally contained the highest quality pools as well. Pools in 1980, 1982, and 1985 were of very high quality with respect to the needs of salmonids, indicating the potential for good resident trout production as well as the rearing of anadromous fry. The upper control, site 3, also contained good quality pool areas, but it does appear that pools in site 2 are beginning to maintain higher quality while those in the controls fluctuate. This may be the first indication of pool quality effects resulting from livestock exclusion in site 2. Pool feature

Table 11.--Summary of annual geomorphic/aquatic and riparian analysis means for Site 1, Upper Bear Valley, Idaho, 1975-1985.

Variable	Study Site 1										
	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Water column											
Stream width (feet)	25.7	25.5	32.6	26.6	24.3	26.2	27.4	29.4	NA	NA	26.2
Channel width (feet)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	27.3
Stream depth (feet)	0.68	0.67	0.60	0.72	0.62	0.79	0.82	1.12	NA	NA	0.70
Riffle width (percent)	50.7	77.2	62.3	84.9	69.3	24.0	65.2	30.1	NA	NA	23.3
Pool width (percent)	49.3	22.8	37.7	15.1	30.7	76.0	34.8	69.9	NA	NA	76.7
Pool quality	3.0	3.0	2.7	1.1	2.4	2.8	2.5	3.7	NA	NA	3.6
Pool feature	5.9	5.2	5.5	1.0	1.0	1.0	6.1	5.4	NA	NA	5.1
Streambanks											
Bank angle (degrees)	95	119	103	88	95	100	103	88	NA	NA	104
Bank undercut (feet)	0.5	0.27	0.33	0.26	0.26	0.23	0.26	0.32	NA	NA	0.20
Shore depth (feet)	NA	0.35	0.23	0.23	0.17	0.21	0.3	0.52	NA	NA	0.26
Fisheries rating	2.9	3.0	3.5	2.4	2.1	2.9	1.9	3.3	NA	NA	NA
Streambottom											
Total fines (percent)	33.5	23.6	34.3	33.6	25.7	26.8	34.1	35.6	NA	NA	41.3
Fines <0.03 in. (percent)	33.5	23.6	17.1	2.6	11.8	20.4	24.9	22.2	NA	NA	23.2
Fines >0.03 in. (percent)	NA	NA	17.2	31.0	13.9	6.4	9.2	13.4	NA	NA	18.1
Gravel (percent)	37.8	41.8	37.1	34.9	42.8	40.4	37.5	34.3	NA	NA	33.6
Rubble (percent)	18.1	26.6	25.9	24.5	25.0	24.2	20.8	18.2	NA	NA	9.3
Boulder (percent)	10.6	7.9	1.9	6.7	6.4	9.0	7.6	11.9	NA	NA	16.0
Embeddedness (rank)	2.9	3.4	2.9	2.8	2.8	2.7	2.8	2.4	NA	NA	1.1
(percent)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	87.0
Instream cover (feet)	NA	NA	NA	0.8	6.9	2.0	1.8	2.3	NA	NA	6.6
Riparian											
Stream cover	2.4	2.0	1.9	1.9	1.9	2.0	2.0	2.1	NA	NA	1.9
Bank stability (rank)	2.6	2.6	2.8	3.2	2.8	2.7	3.4	3.6	NA	NA	3.0
(percent)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	63.6
Habitat type	12.8	14.7	14.2	14.9	15.0	15.5	13.5	15.9	NA	NA	11.8
Vegetative use (percent)	1	73	79	78	4	76	66	0	NA	NA	13
Alteration (percent)											
Natural	39	15	24	9	23	11	9	18	NA	NA	35
Artificial	0	19	12	73	12	35	36	14	NA	NA	24
Total	39	34	36	82	35	46	45	32	NA	NA	59
Vegetative overhang (feet)	0.97	0.70	0.48	0.20	0.35	0.38	0.12	0.38	NA	NA	0.29
Canopy (degrees)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Light intensity (percent)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
(x 10^2 ft candles)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 11.--(continued)

Variable	Study Site 2										
	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Water column											
Stream width (feet)	25.3	25.7	30.7	26.7	24.3	25.1	27.7	28.2	NA	NA	24.7
Channel width (feet)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	26.1
Stream depth (feet)	0.78	0.70	0.60	0.92	0.76	0.92	0.95	1.22	NA	NA	0.88
Riffle width (percent)	49.1	63.7	66.0	75.4	50.1	7.5	61.5	10.0	NA	NA	11.6
Pool width (percent)	50.9	36.3	34.0	24.6	49.9	92.5	38.5	90.0	NA	NA	88.4
Pool quality	3.5	3.4	3.3	1.9	3.3	4.9	3.6	3.9	NA	NA	4.2
Pool feature	6.5	5.5	6.1	1.0	1.0	1.0	7.3	5.1	NA	NA	5.5
Streambanks											
Bank angle (degrees)	100	125	117	90	88	93	90	82	NA	NA	102
Bank undercut (feet)	0.49	0.26	0.15	0.26	0.3	0.34	0.38	0.47	NA	NA	0.29
Shore depth (feet)	NA	0.29	0.19	0.25	0.2	0.29	0.4	0.64	NA	NA	0.32
Fisheries rating	2.7	3.2	3.9	2.4	2.6	3.6	2.4	3.4	NA	NA	NA
Streambottom											
Total fines (percent)	36.8	38.8	45.0	41.5	30.4	34.7	38.6	39.1	NA	NA	38.7
Fines <0.03 in. (percent)	36.8	38.8	26.7	6.4	23.0	24.3	28.3	26.3	NA	NA	28.2
Fines >0.03 in. (percent)	NA	NA	18.3	35.1	7.4	10.4	10.3	12.8	NA	NA	10.5
Gravel (percent)	49.2	43.5	39.0	42.5	52.7	48.1	47.8	47.8	NA	NA	45.5
Rubble (percent)	11.0	15.8	15.1	13.6	15.2	14.4	12.4	9.8	NA	NA	10.7
Boulder (percent)	3.0	1.8	0.8	2.2	1.6	2.7	2.2	3.2	NA	NA	5.1
Embeddedness (rank)	2.6	2.9	2.7	2.4	2.6	2.8	3.0	2.7	NA	NA	1.1
(percent)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	90.0
Instream cover (feet)	NA	NA	NA	1.2	4.3	1.0	1.4	1.8	NA	NA	4.1
Riparian											
Stream cover	1.7	2.0	1.9	1.9	2.0	1.9	2.0	2.1	NA	NA	2.0
Bank stability (rank)	2.0	2.2	2.8	3.1	3.0	2.8	3.3	3.4	NA	NA	3.1
(percent)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	66.4
Habitat type	12.2	12.9	13.2	12.8	16.0	14.7	14.4	16.1	NA	NA	13.4
Vegetative use (percent)	0	76	77	0	1	1	18	1	NA	NA	1
Alteration (percent)											
Natural	42	10	25	18	27	10	10	15	NA	NA	41
Artificial	0	23	16	45	8	24	26	10	NA	NA	26
Total	42	33	41	63	35	34	36	25	NA	NA	67
Vegetative overhang (feet)	0.32	0.51	0.43	0.34	0.21	0.53	0.40	0.43	NA	NA	0.38
Canopy (degrees)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Light intensity (percent)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
(x 10^2 ft candles)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 11.--(continued)

Variable	Study Site 3										
	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
Water column											
Stream width (feet)	24.1	23.2	29.6	26.2	22.1	24.0	25.3	28.1	NA	NA	32.2
Channel width (feet)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	25.2
Stream depth (feet)	0.74	0.72	0.68	0.93	0.66	0.81	0.91	1.22	NA	NA	0.89
Riffle width (percent)	57.1	62.5	57.7	77.2	60.5	8.5	69.8	11.0	NA	NA	14.9
Pool width (percent)	42.9	37.5	42.3	22.8	39.5	91.5	30.2	89.0	NA	NA	85.1
Pool quality	3.5	3.4	3.8	2.6	3.1	4.9	2.7	3.9	NA	NA	4.1
Pool feature	6.5	6.3	6.3	1.0	1.0	1.0	5.5	5.1	NA	NA	5.4
Streambanks											
Bank angle (degrees)	102	121	94	90	98	100	102	94	NA	NA	104
Bank undercut (feet)	0.53	0.34	0.42	0.3	0.28	0.33	0.34	0.39	NA	NA	0.29
Shore depth (feet)	NA	0.4	0.18	0.32	0.26	0.38	0.48	0.68	NA	NA	0.41
Fisheries rating	2.5	3.0	3.9	2.6	2.3	3.8	2.2	3.3	NA	NA	NA
Streambottom											
Total fines (percent)	30.5	26.1	39.6	40.6	28.6	30.6	34.6	28.6	NA	NA	50.2
Fines <0.03 in. (percent)	30.5	26.1	20.3	4.7	22.8	18.6	27.8	21.2	NA	NA	40.1
Fines >0.03 in. (percent)	NA	NA	19.3	35.9	5.8	11.0	6.8	7.4	NA	NA	10.1
Gravel (percent)	55.0	61.5	52.6	50.8	62.8	52.6	54.2	61.2	NA	NA	42.2
Rubble (percent)	9.7	9.4	7.7	6.1	6.6	12.8	8.3	6.0	NA	NA	3.3
Boulder (percent)	4.8	2.9	0.2	2.0	2.0	4.1	3.8	4.1	NA	NA	4.3
Embeddedness (rank)	2.8	3.1	2.5	2.4	2.4	2.9	2.7	2.7	NA	NA	1.1
(percent)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	90.0
Instream cover (feet)	NA	NA	NA	0.9	2.6	0.4	0.8	2.3	NA	NA	3.7
Riparian											
Stream cover	1.7	2.0	2.0	1.9	1.9	1.6	1.9	1.8	NA	NA	1.8
Bank stability (rank)	2.0	2.3	2.6	3.2	2.7	1.9	3.2	2.9	NA	NA	2.7
(percent)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	54.6
Habitat type	1.25	14.1	13.9	12.3	14.4	12.2	13.1	13.8	NA	NA	12.0
Vegetative use (percent	0	80	79	12	63	78	11	78	NA	NA	57
Alteration (percent)											
Natural	46	13	23	15	17	5	12	10	NA	NA	19
Artificial	1	28	9	67	18	46	30	29	NA	NA	43
Total	47	41	32	82	35	51	42	39	NA	NA	62
Vegetative overhang (feet)	0.84	0.62	0.33	0.30	0.22	0.21	0.20	0.45	NA	NA	0.24
Canopy (degrees)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Light intensity (percent)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
(x 10^2 ft candles)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

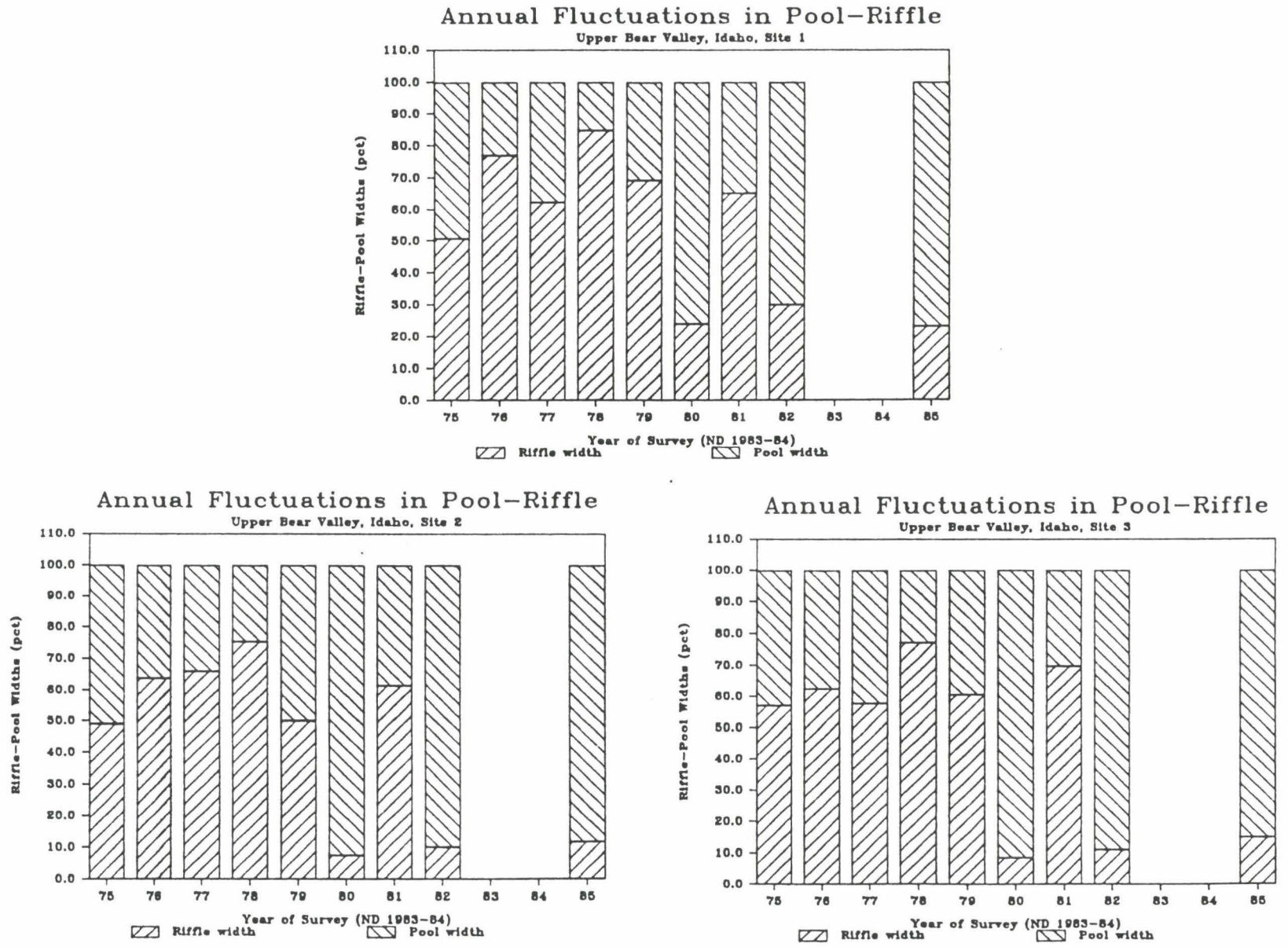


Figure 9. Annual fluctuations in relative abundances of pool and riffle, 1975-1985, Upper Bear Valley, Idaho.

ratings suggest that pools in all sites were chiefly formed by channel characteristics, though some bank influence was also present.

Streambank Variables.

Bank angles in Upper Bear Valley were generally high, especially in the control sites. Only one measurement of an average angle of less than 90° was obtained in either control (88° in site 1 in 1980), indicating generally outsloped streambank structure. Bank angles fluctuated from year to year, probably in response to apparent changes caused by fluctuating water levels, and no definite trends resulting from treatment were clearly detectable, though angles in the treatment site have remained below those of the control sites since 1978.

Since streambank undercuts and bank angles are intimately related, it is not surprising that these two habitat descriptors behaved similarly during the monitoring period. In contrast to bank angles, however, it does appear the undercut is beginning to increase in the treatment site. Since Bear Valley Creek is generally "undercut-poor," this is a very encouraging sign.

Streamshore water depth has been increasing in all three study sites, though this may be more a result of recent heavy streamflows than real structural improvement. This is suggested by the parallel time trends in streamshore depth, stream width, and average stream depth (see also appendix 4). There is, however, some indication that site 2 is experiencing real improvement as well, because its average streamshore depth has moved away from that of site 1 somewhat, and has closed in on the depth in site 3. In 1985, shore depths were down in all three sites, as would be expected from low water levels, with site 2 maintaining an intermediate position.

Fisheries ratings were seldom better than mediocre for such a potentially high quality stream; the occasional ratings above 3.5 were probably results of high flows in 1977, 1981, and 1982 that expanded and deepened pool areas, and exaggerating pool widths in 1980 (see discussion on pool and riffle widths above). No trends were indicated during the monitoring period, and none are herein suggested.

Stream Bottom Variables

Stream bottom surface substrate materials underwent rather wide apparent fluctuations during the monitoring period, particularly with respect to the relative abundances of large and small fines (Figure 10). The cautions concerning the apparent proportions of large and small fine sediments and gravel discussed in reference to Lower Bear Valley apply here as well. Although it is difficult to determine whether a trend is indicated, fine sediments increased in the control sites in 1985 while actually decreasing in site 2. It will be interesting to see if this situation continues.

Rubble amounts seemed to drop while boulder seemed to increase; this may be only an apparent relationship caused by observer confusion over the boundary between large rubble and small boulders. In any case,

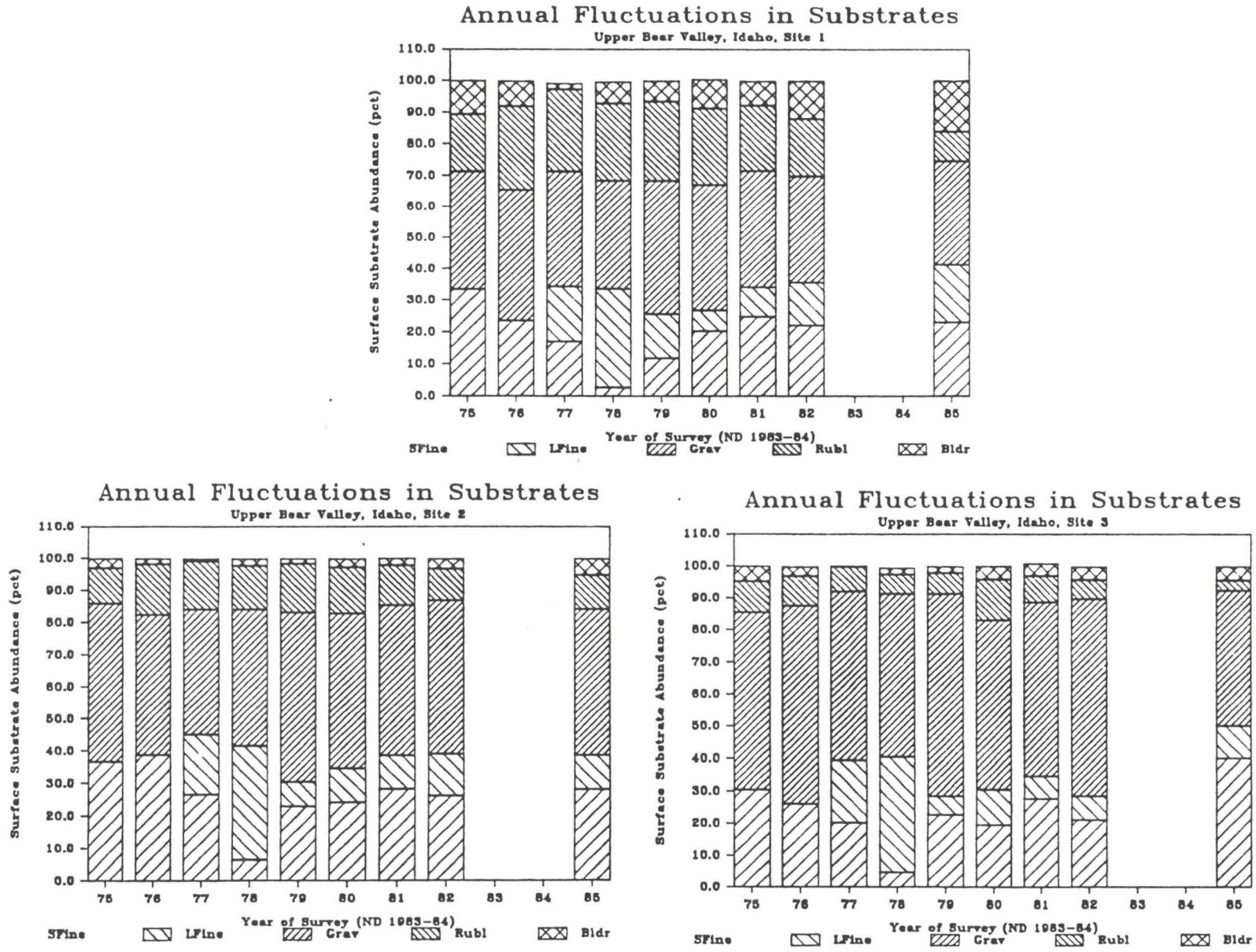


Figure 10. Annual fluctuations in relative abundances of substrate size classes, 1975-1985, Upper Bear Valley, Idaho.

neither substrate category was very abundant in the study area, but both were clearly most prevalent in site 1.

As expected from the abundance of fine sediments, substrate embeddedness in Upper Bear Valley was generally quite high (i.e. low embeddedness rating). The ratings fluctuated little from 1975 through 1982, and seemed to be primarily related inversely to stream width fluctuations. Why this should be so is unclear, and no observable trends in embeddedness have yet been detected. Actual embeddedness was rated at 87 percent (site 1) to 90 percent (sites 2 and 3) in 1985, very high levels.

Instream vegetal cover was never observed to be abundant in Upper Bear Valley, but seemed to be increasing in all sites since 1980.

Riparian Analyses

No definite trends were observed in stream cover conditions as a result of experimental treatment, though there is some suggestion that conditions in site 3 (the upper control site) were deteriorating. This was the only site that registered a lower rating in 1982 than in 1981, and has typically been the poorest of the three sites. Stream cover conditions were otherwise similar in all three sites, and indicated a predominately grassy vegetal cover with considerable brushy and exposed areas.

Bank cover stability was clearly highest in site 1 (the lower control) until 1985 and lowest in site 3. Considering the unpredictable effect of observer bias on apparent annual fluctuations, and despite some incidental unauthorized vegetation use, there was some indication that stability conditions have begun to improve since the rest treatment began in site 2. Initial measurements showed site 2 to be considerably poorer than site 1, but this difference has disappeared. Conditions in site 3 have fluctuated a great deal from year to year, reflecting the inherently less stable conditions in that site.

The habitat type rating seemed to be increasing in the treatment site, particularly in a relative sense, while fluctuating within fairly narrow limits in the two control sites. This suggests some potential improvement in the fish habitat conditions as soil-binding and cover-providing plants comprise an increasing proportion of the dominant streambank structure, and is also reflected in the apparently static-to-increasing trend in vegetal overhang in the face of general reductions in such overhang in the controls. Greater stability in site 1 relative to site 3 is also reflected in the higher-amplitude oscillations in habitat type ratings in site 3; less stable streambanks can be expected to incur larger real and apparent changes in condition in response to such fluctuating external forces as streamflow, grazing use, locally heavy thunderstorms, and so forth.

Except for scheduled rest years, vegetation use by livestock was consistently heavy in sites 1 and 3, and was occasionally significant in supposed rest years. It is not unusual for rested pastures to receive some use during years of below-normal forage production, and may present

no problem on upland ranges with use levels that seldom exceed 50 percent. Unfortunately, however, the riparian vegetation along Bear Valley Creek appears to incur less than 50 percent use only during rested years; for each year that use was scheduled in the Upper Bear Valley study area, the average vegetation use in sites 1 and 3 was 74 and 75 percent respectively.

Initially, the average vegetation overhang was greatest in the two control sites, particularly in site 1. While the amount of overhang has fluctuated considerably in all three sites, only in site 2 has the amount increased over its initial level; in fact, overhang in sites 1 and 3 were 61 and 46 percent of their initial values, respectively. While certainly not conclusive at this time, this result does suggest improvement in site 2, and is in accord with the bank cover stability and habitat type changes already discussed. Since vegetation overhang lengths were generally low (never more than 4 percent of average stream width), this result is encouraging.

Prior to completion of the livestock exclosure in 1978, levels of streambank alteration, both artificial and natural, were similar. Alteration levels appear to have fluctuated a great deal from year to year, reflecting the subjectivity of this measurement. In general, however, recorded levels and fluctuation amplitudes have declined as greater consistency has been achieved, and the last 4 years of measurement probably more truly reflect actual levels. Accordingly, the fluctuation amplitude as well as the amount of alteration from all sources (total alteration) were reduced most in the treatment pasture, suggesting once again that the rehabilitative process had begun as early as 1982, until 1985 when additional stress led to increased alterations ascribed to natural causes.

Canopy cover and light intensity measurements were incorporated for only a brief period in 1981 and 1982, and yielded little useful information. Canopy cover was little different between sites, and neither the light meter method nor the card method suggested substantial differences in incident light intensity. In addition, evaluation of thermal input with the Solar Pathfinder™ revealed little difference between sites with respect to thermal loading (Table 12). Annual thermal regimes between sites were also similar (Figure 11).

Table 12.--Average thermal input in Upper Bear Valley by site.

Variable	Study Site		
	Site 1	Site 2	Site 3
Average Input (BTU/ft^2/day)	1399	1450	1454
July Input (BTU/ft^2/day)	2520	2574	2585

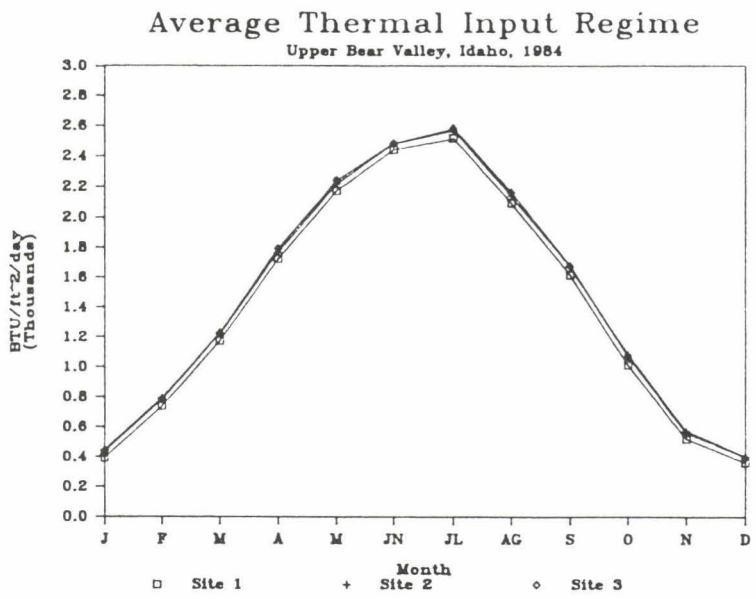


Figure 11. Average thermal input regime by study site, Upper Bear Valley, Idaho.

Riparian Community Classification

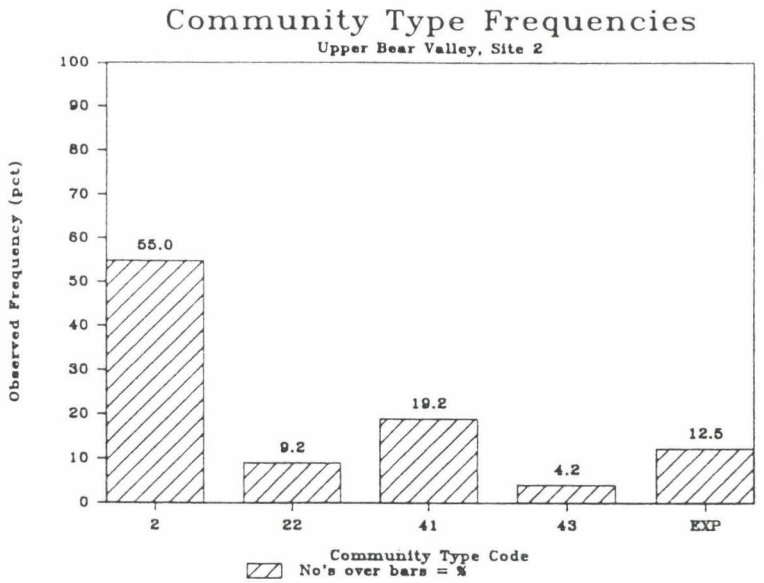
Fewer riparian community types were recorded in Upper Bear Valley than were encountered in Lower Bear Valley (Figure 12). No CT's were encountered that were not also present in Lower Bear Valley. The CAAQ CT was the most common in Upper Bear Valley as it was in Lower Bear Valley. CAAQ was least abundant in site 2, the ungrazed treatment site, where the DECE CT was most abundant. CAAQ was most prevalent in site 3, as were exposed types; willow types, which were quite abundant in sites 1 and 2, were quite scarce in site 3.

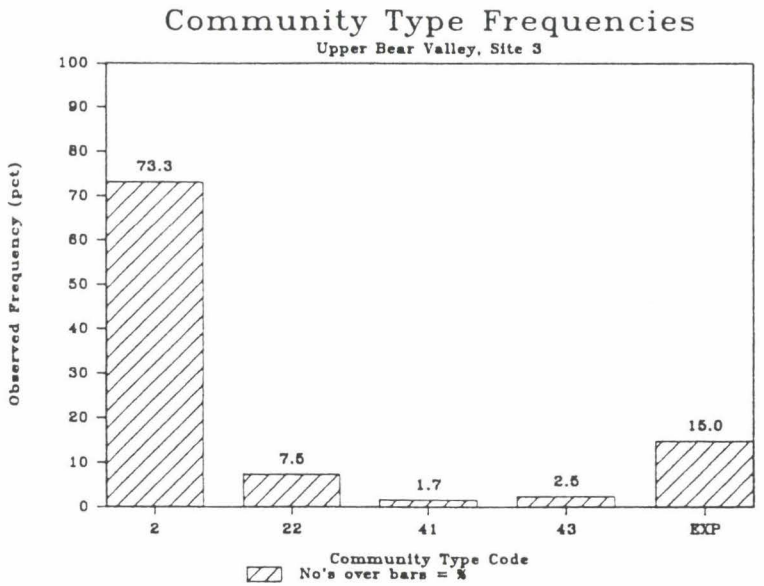
Streamside Herbage Analyses

Streamside forage biomass and yield differential between study sites has been performed each year since 1979 (Table 13), and results were similar to those obtained on Lower Bear Valley. Coefficients of determination (R^2) tended to be somewhat lower in Upper Bear Valley, and residual error was generally a bit higher. The large productivity differences between sites reflect use by cattle; percent harvest is presented in Table 14 for comparison with visual use estimates. Clearly, site 3, in the Big Meadows pasture, receives much heavier use than site 1, in the Sheeptrail pasture; however, productivity tends to be greater in site 3 than in site 1 during rested years. Except for 1981 and 1982, very wet years, capacitance meter estimates of use have tended to be lower than visual estimates.

Fish Population Analyses

Only 2 years of fish population data, 1976 and 1978, were collected in Upper Bear Valley (Table 15). The most striking result of these two





Key to Community Types:

Code	Description
002	CAAQ
022	DECE
041	SAWO-BEGL/CARO-CAAQ
043	SAWO-SAEA/Mesic Herb
EXP	Misc. Non-vegetal CT's

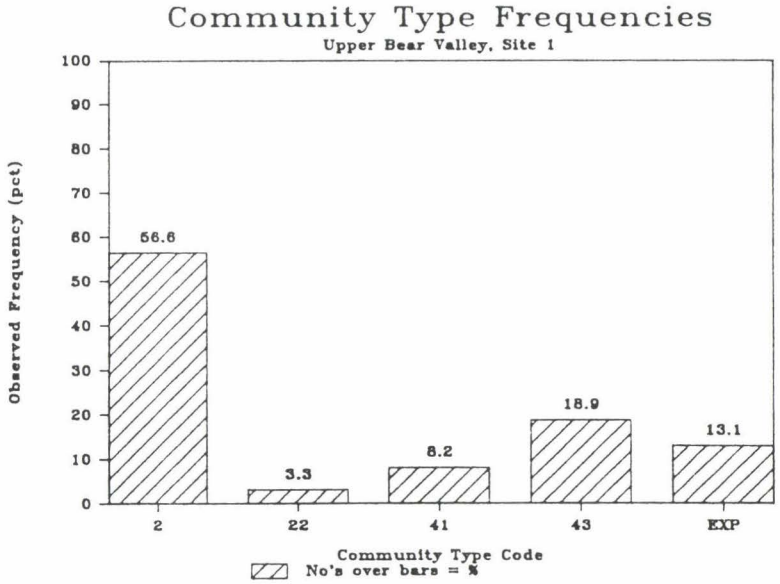


Figure 12. Riparian community type frequencies by study site, Upper Bear Valley, Idaho (1983 data).

Table 13.--Streamside herbage analysis results, Upper Bear Valley, Idaho, 1979-1984.

	Statistics									Production					
	Metric			English			Undimensioned			Site 1		Site 2		Site 3	
Year	a	b	S(y.x)	a	b	S(y.x)	n	R	R^2	lb/ac	kg/ha	lb/ac	kg/ha	lb/ac	kg/ha
1979	0.11	0.05	0.34	3.21	1.52	9.53	16	0.75	0.56	1100	1235	1122	1259	966	1084
1980	-0.14	0.07	0.34	-3.85	1.98	9.65	23	0.89	0.80	1180	1436	1894	2126	579	650
1981	0.21	0.12	0.45	6.05	3.38	12.77	19	0.88	0.78	1814	2035	2446	2744	1861	2088
1982	-0.75	0.09	0.62	-21.22	2.56	17.54	23	0.93	0.87	3453	3874	3911	4388	1262	1416
1983	-0.36	0.05	0.37	-10.22	1.38	10.57	24	0.86	0.73	1016	1139	1996	2240	452	507
1984	-0.47	0.09	0.64	-13.21	2.55	18.16	24	0.75	0.56	1580	1773	2209	2480	1802	2022
1985	0.38	0.01	0.32	10.9	0.31	9.17	30	0.88	0.78	1096	1230	1142	1394	816	916

Table 14.--Forage yield differentials and visual estimates of vegetation use, Upper Bear Valley.

Year	Yield Differential (pct)		Visual Estimates (pct)	
	Site 1	Site 3	Site 1	Site 3
1975	ND[1/]	ND	1	0
1976	ND	ND	73	80
1977	ND	ND	79	79
1978	ND	ND	78	12
1979	2	14	4	62
1980	38	69	76	78
1981	26	24	66	11
1982	12	68	0	78
1983	49	77	ND	ND
1984	28	18	ND	ND
1985	4	20	13	57

[1/] ND - No data.

Table 15.--Summary of annual fish population analysis results, Upper Bear Valley, Idaho (1976-1980).

Species/Variable	Site 1					Site 2					Site 3				
	1976	1977	1978	1979	1980	1976	1977	1978	1979	1980	1976	1977	1978	1979	1980
Chinook salmon															
Total catch (#)	28	NA	67	NA	NA	30	NA	46	NA	NA	2	NA	145	NA	NA
Population estimate (#)	28	NA	68	NA	NA	30	NA	47	NA	NA	2	NA	146	NA	NA
Mean length (in)	2.59	NA	NA	NA	NA	2.29	NA	2.56	NA	NA	2.87	NA	2.42	NA	NA
(mm)	65.8	NA	NA	NA	NA	58.1	NA	65.0	NA	NA	73.0	NA	61.5	NA	NA
Mean weight (oz)	0.22	NA	NA	NA	NA	0.10	NA	0.17	NA	NA	0.13	NA	NA		
(gm)	6.2	NA	NA	NA	NA	6.2	NA	4.7	NA	NA	3.8	NA	3.6	NA	NA
Estimated biomass															
(oz/ft^2)	<0.001	NA	NA	NA	NA	<0.001	NA	<0.001	NA	NA	<0.001	NA	0.001	NA	NA
(oz/ft^3)	<0.001	NA	NA	NA	NA	<0.001	NA	<0.001	NA	NA	<0.001	NA	0.001	NA	NA
(gm/m^2)	0.123	NA	NA	NA	NA	0.059	NA	0.150	NA	NA	0.006	NA	0.363	NA	NA
(gm/m^3)	0.602	NA	NA	NA	NA	0.277	NA	0.535	NA	NA	0.027	NA	1.281	NA	NA
Estimated standing crop															
($\#/ft^2$)	0.002	NA	0.004	NA	NA	0.002	NA	0.003	NA	NA	<0.001	NA	0.009	NA	NA
($\#/ft^3$)	0.003	NA	0.006	NA	NA	0.002	NA	0.003	NA	NA	<0.001	NA	0.010	NA	NA
($\#/mi^2$)	246	NA	598	NA	NA	264	NA	414	NA	NA	18	NA	1285	NA	NA
($\#/m^2$)	0.020	NA	0.046	NA	NA	0.021	NA	0.032	NA	NA	0.002	NA	0.100	NA	NA
($\#/m^3$)	0.096	NA	0.209	NA	NA	0.087	NA	0.113	NA	NA	0.007	NA	0.353	NA	NA
(#/km)	153	NA	372	NA	NA	164	NA	257	NA	NA	11	NA	799	NA	NA
Rainbow trout															
Total catch (#)	2	NA	1	NA	NA	4	NA	1	NA	NA	3	NA	8	NA	NA
Population estimate (#)	2	NA	1	NA	NA	4	NA	1	NA	NA	3	NA	8	NA	NA
Mean length (in)	NA	NA	NA	NA	NA	5.00	NA	7.20	NA	NA	2.93	NA	5.82	NA	NA
(mm)	NA	NA	NA	NA	NA	127.0	NA	148.0	NA	NA	74.3	NA	147.9	NA	NA
Mean weight (oz)	NA	NA	NA	NA	NA	1.23	NA	2.62	NA	NA	0.12	NA	1.77	NA	NA
(gm)	NA	NA	NA	NA	NA	34.8	NA	74.4	NA	NA	3.4	NA	50.0	NA	NA
Estimated biomass															
(oz/ft^2)	NA	NA	NA	NA	NA	<0.001	NA	NA	NA	NA	<0.001	NA	0.001	NA	NA
(oz/ft^3)	NA	NA	NA	NA	NA	<0.001	NA	NA	NA	NA	<0.001	NA	0.001	NA	NA
(gm/m^2)	NA	NA	NA	NA	NA	0.097	NA	NA	NA	NA	0.008	NA	0.274	NA	NA
(gm/m^3)	NA	NA	NA	NA	NA	0.455	NA	NA	NA	NA	0.036	NA	0.967	NA	NA
Estimated standing crop															
($\#/ft^2$)	<0.001	NA	<0.001	NA	NA	<0.001	NA	<0.001	NA	NA	<0.001	NA	0.001	NA	NA
($\#/ft^3$)	<0.001	NA	<0.001	NA	NA	<0.001	NA	<0.001	NA	NA	<0.001	NA	0.001	NA	NA
($\#/mi^2$)	18	NA	9	NA	NA	35	NA	9	NA	NA	26	NA	70	NA	NA
($\#/m^2$)	0.001	NA	0.001	NA	NA	0.003	NA	0.001	NA	NA	0.002	NA	0.005	NA	NA
($\#/m^3$)	0.007	NA	0.003	NA	NA	0.012	NA	0.002	NA	NA	0.011	NA	0.019	NA	NA
(#/km)	11	NA	5	NA	NA	22	NA	5	NA	NA	16	NA	44	NA	NA

NA = not available

Table 15.--(Cont.)

Species/Variable	Site 1					Site 2					Site 3				
	1976	1977	1978	1979	1980	1976	1977	1978	1979	1980	1976	1977	1978	1979	1980
Eastern brook trout															
Total catch (#)	11	NA	34	NA	NA	12	NA	48	NA	NA	0	NA	72	NA	NA
Population estimate (#)	11	NA	34	NA	NA	13	NA	48	NA	NA	0	NA	72	NA	NA
Mean length (in)	5.38	NA	NA	NA	NA	4.85	NA	2.66	NA	NA	NA	NA	1.94	NA	NA
(mm)	136.6	NA	NA	NA	NA	123.3	NA	67.7	NA	NA	NA	NA	49.4	NA	NA
Mean weight (oz)	1.59	NA	NA	NA	NA	0.75	NA	0.36	NA	NA	NA	NA	0.09	NA	NA
(gm)	45.2	NA	NA	NA	NA	21.3	NA	10.3	NA	NA	NA	NA	2.6	NA	NA
Estimated biomass															
(oz/ft^2)	0.001	NA	NA	NA	NA	0.001	NA	0.001	NA	NA	NA	NA	<0.001	NA	NA
(oz/ft^3)	0.001	NA	NA	NA	NA	0.001	NA	0.001	NA	NA	NA	NA	<0.001	NA	NA
(gm/m^2)	0.350	NA	NA	NA	NA	0.193	NA	0.332	NA	NA	NA	NA	0.128	NA	NA
(gm/m^3)	1.400	NA	NA	NA	NA	0.802	NA	1.252	NA	NA	NA	NA	0.461	NA	NA
Estimated standing crop															
($\#/ft^2$)	0.001	NA	0.002	NA	NA	0.001	NA	0.003	NA	NA	0.000	NA	0.005	NA	NA
($\#/ft^3$)	0.001	NA	0.003	NA	NA	0.001	NA	0.003	NA	NA	0.000	NA	0.005	NA	NA
($\#/mi^2$)	97	NA	299	NA	NA	114	NA	422	NA	NA	0	NA	634	NA	NA
($\#/m^2$)	0.008	NA	0.023	NA	NA	0.009	NA	0.032	NA	NA	0.000	NA	0.049	NA	NA
($\#/m^3$)	0.038	NA	0.094	NA	NA	0.038	NA	0.115	NA	NA	0.000	NA	0.174	NA	NA
(#/km)	60	NA	186	NA	NA	71	NA	263	NA	NA	0	NA	394	NA	NA
Bull trout															
Total catch (#)	4	NA	5	NA	NA	3	NA	3	NA	NA	4	NA	10	NA	NA
Population estimate (#)	4	NA	5	NA	NA	3	NA	3	NA	NA	4	NA	10	NA	NA
Mean length (in)	5.89	NA	7.20	NA	NA	6.17	NA	NA	NA	NA	5.55	NA	NA	NA	NA
(mm)	149.5	NA	182.8	NA	NA	156.7	NA	NA	NA	NA	141.00	NA	NA	NA	NA
Mean weight (oz)	1.13	NA	1.40	NA	NA	1.24	NA	NA	NA	NA	1.09	NA	NA	NA	NA
(gm)	32.1	NA	39.6	NA	NA	35.2	NA	NA	NA	NA	32.6	NA	NA	NA	NA
Estimated biomass															
(oz/ft^2)	<0.001	NA	<0.001	NA	NA	<0.001	NA	NA	NA	NA	<0.001	NA	NA	NA	NA
(oz/ft^3)	<0.001	NA	<0.001	NA	NA	<0.001	NA	NA	NA	NA	<0.001	NA	NA	NA	NA
(gm/m^2)	0.091	NA	0.134	NA	NA	0.074	NA	NA	NA	NA	0.086	NA	NA	NA	NA
(gm/m^3)	0.364	NA	0.550	NA	NA	0.307	NA	NA	NA	NA	0.0322	NA	NA	NA	NA
Estimated standing crop															
($\#/ft^2$)	<0.001	NA	<0.001	NA	NA	<0.001	NA	<0.001	NA	NA	<0.001	NA	<0.001	NA	NA
($\#/ft^3$)	<0.001	NA	<0.001	NA	NA	<0.001	NA	<0.001	NA	NA	<0.001	NA	<0.001	NA	NA
($\#/mi^2$)	35	NA	44	NA	NA	26	NA	26	NA	NA	35	NA	88	NA	NA
($\#/m^2$)	0.003	NA	0.003	NA	NA	0.003	NA	0.002	NA	NA	0.003	NA	0.003	NA	NA
($\#/m^3$)	0.014	NA	0.015	NA	NA	0.014	NA	0.008	NA	NA	0.012	NA	0.012	NA	NA
(#/km)	22	NA	27	NA	NA	16	NA	16	NA	NA	22	NA	55	NA	NA

NA = not available

Table 15.--(Cont.)

Species/Variable	Site 1					Site 2					Site 3				
	1976	1977	1978	1979	1980	1976	1977	1978	1979	1980	1976	1977	1978	1979	1980
Whitefish															
Total catch (#)	0	NA	18	NA	NA	1	NA	3	NA	NA	1	NA	34	NA	NA
Population estimate (#)	0	NA	19	NA	NA	1	NA	3	NA	NA	1	NA	35	NA	NA
Mean length (in)	NA	NA	2.89	NA	NA	2.13	NA	3.74	NA	NA	2.56	NA	2.46	NA	NA
(mm)	NA	NA	73.3	NA	NA	54	NA	95.0	NA	NA	65.0	NA	62.5	NA	NA
Mean weight (oz)	NA	NA	0.98	NA	NA	0.05	NA	0.37	NA	NA	0.05	NA	0.14	NA	NA
(gm)	NA	NA	27.7	NA	NA	1.5	NA	10.6	NA	NA	1.3	NA	3.8	NA	NA
Estimated biomass															
(oz/ft^2)	NA	NA	0.001	NA	NA	<0.001	NA	<0.001	NA	NA	<0.001	NA	<0.001	NA	NA
(oz/ft^3)	NA	NA	0.002	NA	NA	<0.001	NA	<0.001	NA	NA	<0.001	NA	<0.001	NA	NA
(gm/m^2)	NA	NA	0.355	NA	NA	0.001	NA	0.021	NA	NA	0.001	NA	0.091	NA	NA
(gm/m^3)	NA	NA	1.617	NA	NA	0.001	NA	0.076	NA	NA	0.001	NA	0.132	NA	NA
Estimated standing crop															
($\#/ft^2$)	NA	NA	0.001	NA	NA	0.001	NA	<0.001	NA	NA	<0.001	NA	0.002	NA	NA
($\#/ft^3$)	NA	NA	0.002	NA	NA	<0.001	NA	<0.001	NA	NA	<0.001	NA	0.002	NA	NA
(#/mi)	NA	NA	167	NA	NA	9	NA	26	NA	NA	9	NA	308	NA	NA
($\#/m^2$)	NA	NA	0.013	NA	NA	0.001	NA	0.002	NA	NA	0.001	NA	0.024	NA	NA
($\#/m^3$)	NA	NA	0.058	NA	NA	0.003	NA	0.113	NA	NA	0.007	NA	0.085	NA	NA
(#/km)	NA	NA	104	NA	NA	5	NA	16	NA	NA	5	NA	191	NA	NA
Sculpin															
Total catch (#)	288	NA	1903	NA	NA	218	NA	1666	NA	NA	143	NA	2583	NA	NA
Population estimate (#)	288	NA	1967	NA	NA	448	NA	677	NA	NA	188	NA	2610	NA	NA
Mean length (in)	2.33	NA	NA	NA	NA	2.41	NA	NA	NA	NA	2.41	NA	NA	NA	NA
(mm)	59.2	NA	NA	NA	NA	61.3	NA	NA	NA	NA	61.2	NA	NA	NA	NA
Mean weight (oz)	0.15	NA	0.04	NA	NA	0.16	NA	0.05	NA	NA	0.14	NA	0.05	NA	NA
(gm)	4.4	NA	1.1	NA	NA	4.1	NA	1.4	NA	NA	3.9	NA	1.3	NA	NA
Estimated biomass															
(oz/ft^2)	0.003	NA	0.005	NA	NA	0.005	NA	0.005	NA	NA	0.002	NA	0.008	NA	NA
(oz/ft^3)	0.004	NA	0.007	NA	NA	0.007	NA	0.006	NA	NA	0.003	NA	0.009	NA	NA
(gm/m^2)	0.892	NA	1.459	NA	NA	1.282	NA	1.577	NA	NA	0.567	NA	2.323	NA	NA
(gm/m^3)	4.366	NA	6.649	NA	NA	6.009	NA	5.626	NA	NA	2.583	NA	8.196	NA	NA
Estimated standing crop															
($\#/ft^2$)	0.019	NA	0.123	NA	NA	0.029	NA	0.105	NA	NA	0.014	NA	0.166	NA	NA
($\#/ft^3$)	0.028	NA	0.171	NA	NA	0.042	NA	0.114	NA	NA	0.019	NA	0.179	NA	NA
(#/mi)	2534	NA	17310	NA	NA	3942	NA	14758	NA	NA	1654	NA	22968	NA	NA
($\#/m^2$)	0.203	NA	1.327	NA	NA	0.301	NA	1.127	NA	NA	0.145	NA	1.787	NA	NA
($\#/m^3$)	0.992	NA	6.045	NA	NA	0.012	NA	4.018	NA	NA	0.011	NA	6.305	NA	NA
(#/km)	1575	NA	10758	NA	NA	2450	NA	9172	NA	NA	1028	NA	14275	NA	NA

NA = not available

analyses was the great difference in fish population characteristics between this study area and Lower Bear Valley. One might expect that when the populations of anadromous fish were low in one study area, they might also be low in the other, but such was not the case. Both chinook salmon and rainbow trout were relatively abundant in Lower Bear Valley in 1976, but were quite scarce in Upper Bear Valley; in 1978, essentially the opposite condition occurred with respect to salmon, but rainbow trout were abundant in neither study area (Figure 13). Too few rainbow trout were collected in Upper Bear Valley to yield any useful weight information, but the salmon collected clearly consisted chiefly of age 0+ individuals. Sculpin clearly dominated the fish community (Figure 14).

Eastern brook trout populations acted very much like salmon populations in that they were more abundant in the upper study area than in the lower study area in 1978, with the opposite situation prevailing in 1976. The lower average sizes in 1978 suggest a higher density of age 0+ fish in Upper Bear Valley in 1978 than in Lower Bear Valley, as well as greater reproductive success than occurred in Upper Bear Valley in 1976.

Bull trout numbers were little different either between areas or between years, and never constituted a major proportion of any sampled population. Whitefish were more abundant in Upper Bear Valley in 1978 than in 1976, as were sculpin, the most abundant species in the study area.

Hydraulic Geometry Analysis

Hydrologic data were collected on Upper Bear Valley only in 1976 (Table 16). Channel gradient was clearly highest in site 1, the lower control but, interestingly, velocity was highest in the treatment site. This situation seems to be a result of a narrower channel and water column in site 2 (cf Table 11). Clearly, Upper Bear Valley was considerably smaller than lower Bear Valley, but generally of similar gradient. Actual cross-sectional diagrams are presented in appendix 12.

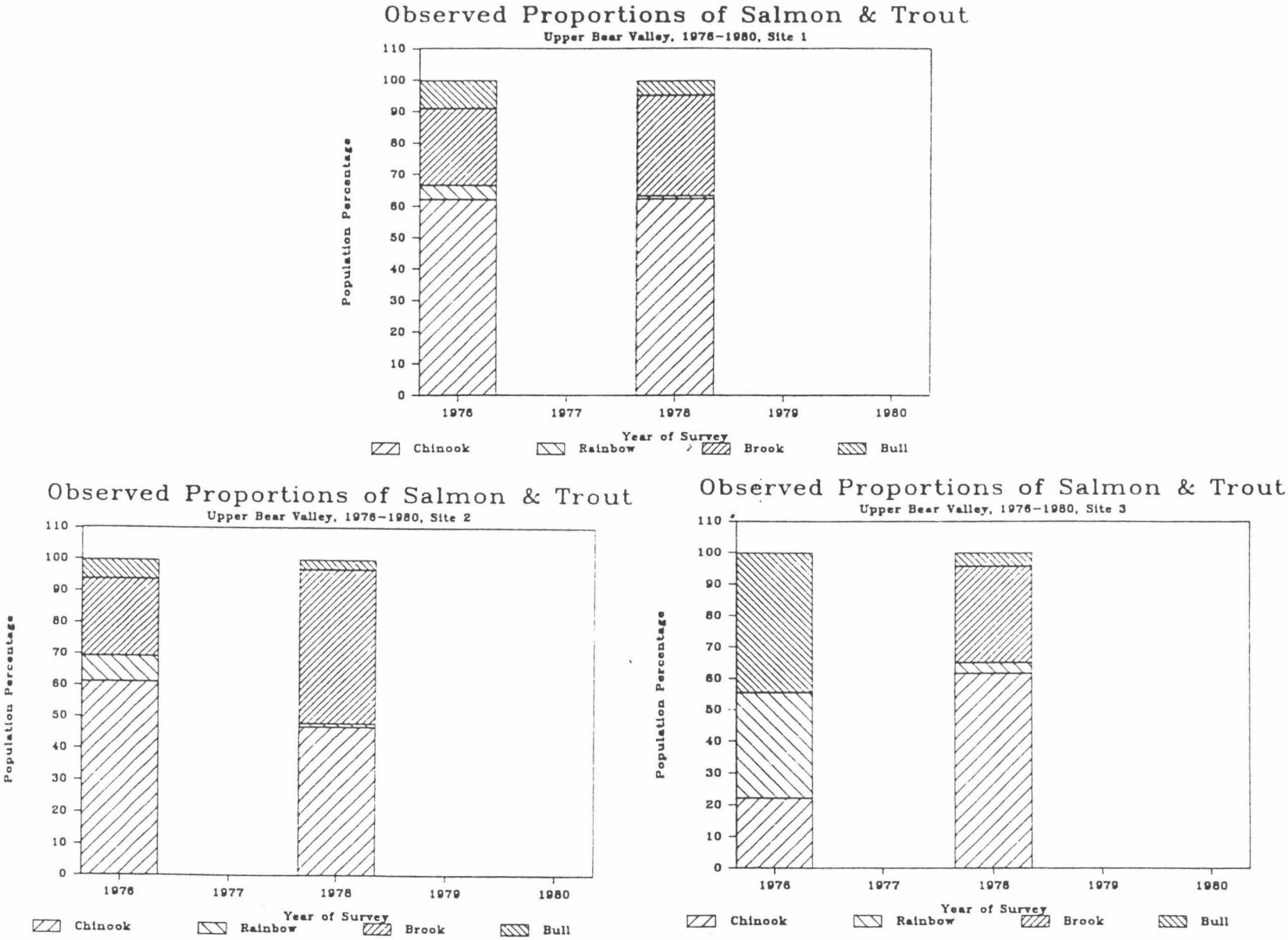


Figure 13. Observed relative abundances of game fish species in Lower Bear Valley by site, 1976-1980.

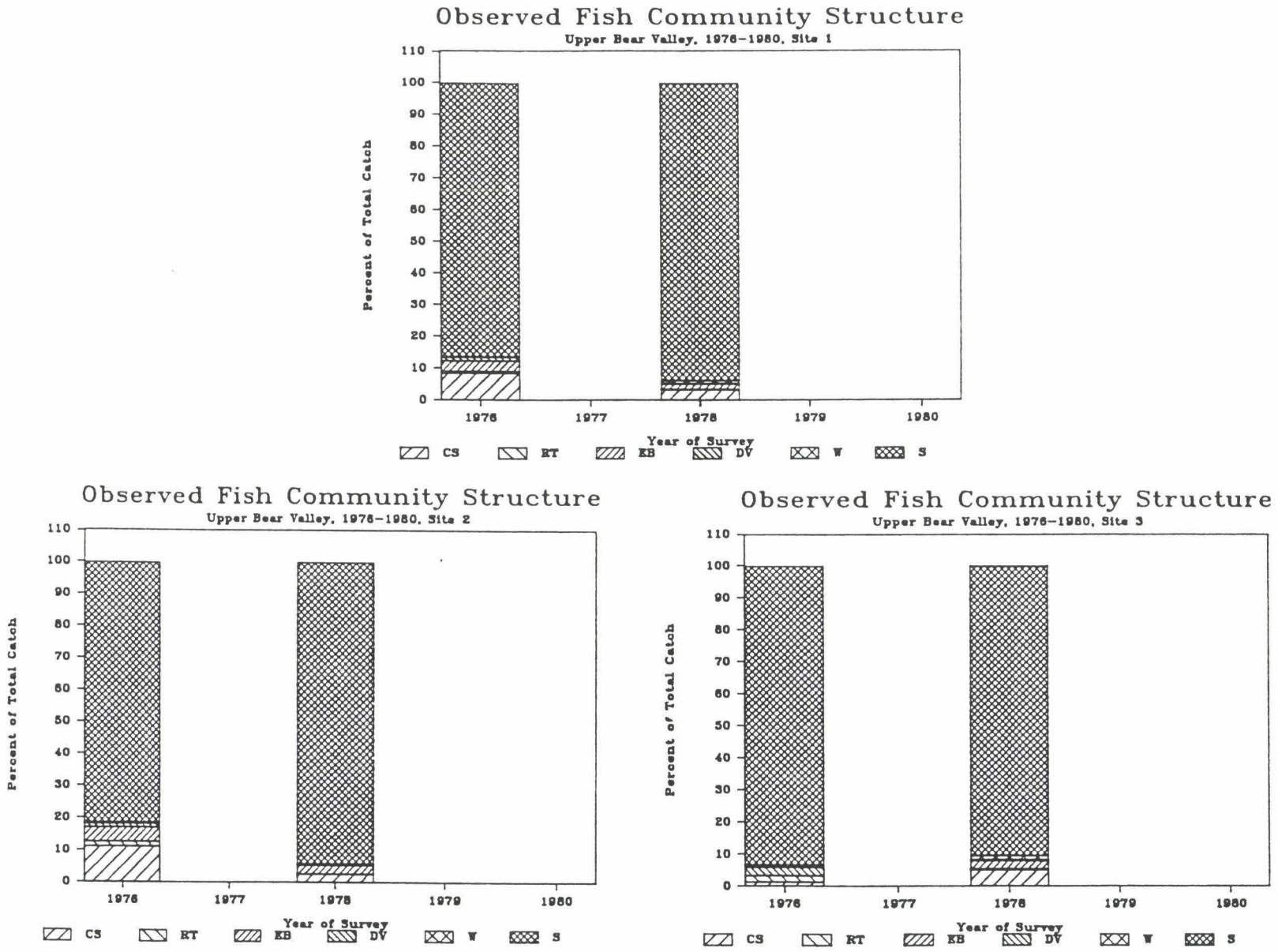


Figure 14. Observed relative abundances of all fish species, 1976-1980, Upper Bear Valley, Idaho (cross-hatched block is sculpin, bottom block is Chinook salmon).

Table 16.--Summary of hydrologic variable means, Upper Bear Valley, Idaho, 1976.

Variable	Site 1	Site 2	Site 3
Slope (pct)	0.37	0.12	0.09
Wetted area (ft^3)	18.7	16.1	22.4
Wetted perimeter (ft)	24.7	23.1	24.6
Wetted width (ft)	26.9	22.4	23.6
Wetted depth (ft)	0.71	0.74	0.96
Wetted hydraulic radius	0.67	0.72	0.92
Wetted flow (ft^3/sec)	17.1	17.5	17.3
Wetted velocity (ft/sec)	0.92	1.16	0.81
Stream power	0.14	0.06	0.05
Manning n	0.07	0.04	0.05

CONCLUSIONS

Aquatic and riparian conditions within both Bear Valley study areas clearly reflected the impacts of historic consumptive resource uses in the area. Both mining and grazing within the valley have probably contributed to the suboptimal fishery habitat conditions observed, but the separate effects of these two land uses cannot be clearly distinguished. Baseline habitat conditions, those apparently maintained by the current rest-rotation grazing, have now been well-documented, but additional time is needed to document rehabilitative changes within the livestock exclosures. Improvement in some vegetal parameters was suggested by the data, but cannot be positively discribed; structional changes can be expected to occur even more slowly.

Fish populations were generally low (except for sculpin), and interesting hybrids of bull and brook trout were encountered on many occasions. While fine sediment levels were below the optimal levels reported for such species as rainbow trout (<10 percent fines) (Raleigh and others 1984), the abundance of sculpin, which have similar substrate preferences, is encouraging. The general decline of chinook salmon during the course of the study, however, is less so; the combination of local and downstream stressors being apparantly highly inimical to their success. Salmon enhancement efforts that are anticipated for the near future between IF&G and tribal resource managers may hold some hope for revival of this great resource.

At this time, the most that can be positively asserted is that conditions along Bear Valley Creek could profit by improvement. Livestock grazing may now be influencing streamside conditions, as historic practices surely have, but precise vegetative influence cannot be described; influences from historic mining practices may be the overriding consideration with respect to instream sediment loads. Unusual weather patterns during the study and periods of low forage production have also altered normal rest-rotation management, and have further clouded the issue. Additional study is clearly indicated if definite answers are to be found.

LITERATURE CITED

Council for Agricultural Science and Technology (CAST). 1974. Livestock grazing on federal lands in the 11 western states. Journal of Range Management. 27(3): 74-181.

Hermann, F. J. 1970. Manual of the carices of the Rocky Mountains and Colorado Basin. Agriculture Handbook No. 374. USDA Forest Service, Washington, DC. 397 p.

Jensen, S., and J. S. Tuhy. 1982. Riparian classification for the Upper Salmon/Middle Fork Salmon River drainage, Idaho. Final Report to the USDA Forest Service, Region 4. White Horse Associates, Smithfield, UT. 98 p.

Minshall, G. W. 1967. The role of allochthonous detritus in the trophic structure of a woodland spring-brook community. Ecology 48(1): 139-149.

Neal, D. L., P. O. Currie, and M. J. Morris. 1976. Sampling herbaceous native vegetation with an electronic capacitance instrument. Journal of Range Management. 29: 72-77.

Platts, W. S. 1968.

Platts, W. S. 1976. The colonization of the South Fork Salmon River by the Columbia sculpin (*Cottus hubbsi*). Journal of Idaho Academic Sciences. 12(1): 47-49.

Platts, W. S. and C. Rountree. 1972. Bear Valley Creek, Idaho, aquatic environment and fisheries study. Unpublished report on file, USDA Forest Service, Region 4, Boise National Forest, Boise, Idaho. 53 p.

Platts, W. S. 1979. Relationships among stream order, fish populations, and aquatic geomorphology in an Idaho river drainage. Fisheries 4(2): 5-9.

Platts, W. S., M. McHenry, and R. Torquemada. 1986. Evaluation of fish habitat enhancement projects in Crooked River, Red River, and Bear Valley Creek. Progress Report II. Unpublished report on file USDA Forest Service, Intermountain Forest and Range Experiment Station, Forestry Sciences Laboratory, Boise, ID. 19 p.

Platts, W. S., W. F. Megahan, and G. W. Minshall. 1983. Methods for evaluating stream, riparian, and biotic conditions. USDA Forest Service General Technical Report INT-138. Intermountain Forest and Range Experiment Station, Ogden, UT. 70 p.

Platts, W. S., and R. L. Nelson. 1983. The electronic capacitance meter: a tool for evaluating riparian-fishery habitat. North American Journal of Fisheries Management. 3(4): 219-227.

Platts, W. S. et al. (in press). Methods for evaluating riparian habitats. USDA Forest Service General Technical Report, Intermountain Forest and Range Experiment Station, Ogden, UT.

Platts, W. S., and R. L. Nelson. (in press a). Effects of rest-rotation grazing and impacts to streambanks in Idaho forested watersheds. Accepted for publication by the North American Journal of Fisheries Management.

Platts, W. S., and R. L. Nelson. (in press b). Effects of livestock grazing and instream improvement structures: Big Creek, Utah. Accepted for publication by the Journal of Soil and Water Conservation.

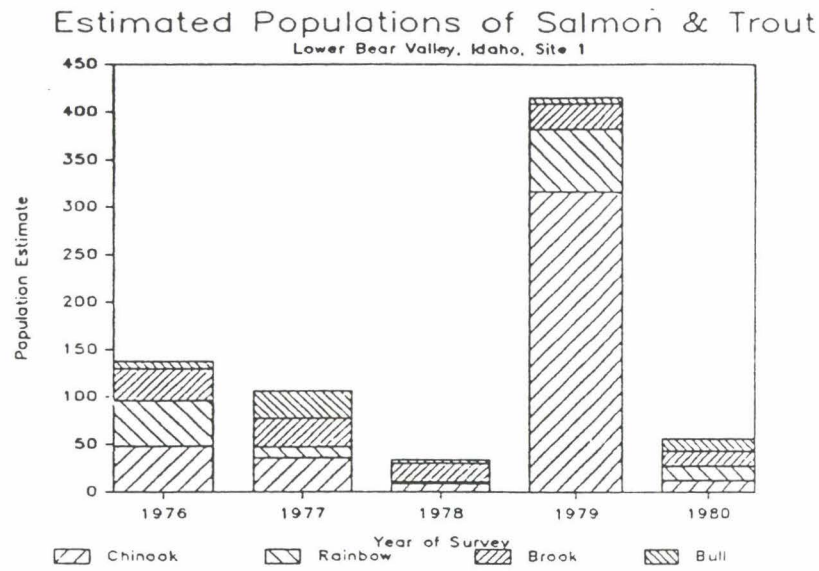
Raleigh, R. F., R. Hickman, R. C. Solomon, and P. C. Nelson. 1984. Habitat suitability information: rainbow trout. USDI Fish and Wildlife Service, Office of Biological Services, Western Energy Land Use Team, Washington, DC. FWS/OBS-82/10.60. 64 p.

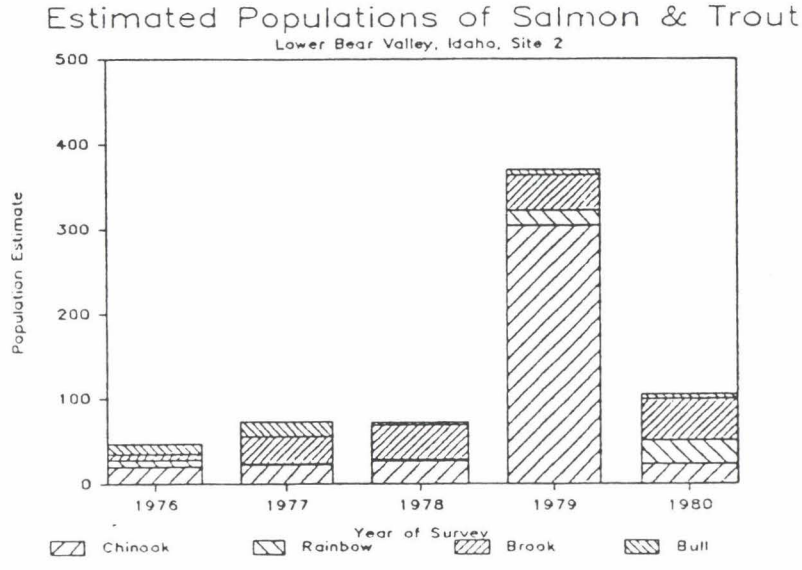
Ray, G. A., and W. F. Megahan. 1978. Measuring cross sections using a sag-tape: a generalized procedure. USDA Forest Service General Technical Report INT-47. Intermountain Forest and Range Experiment Station, Ogden, UT. 12 p.

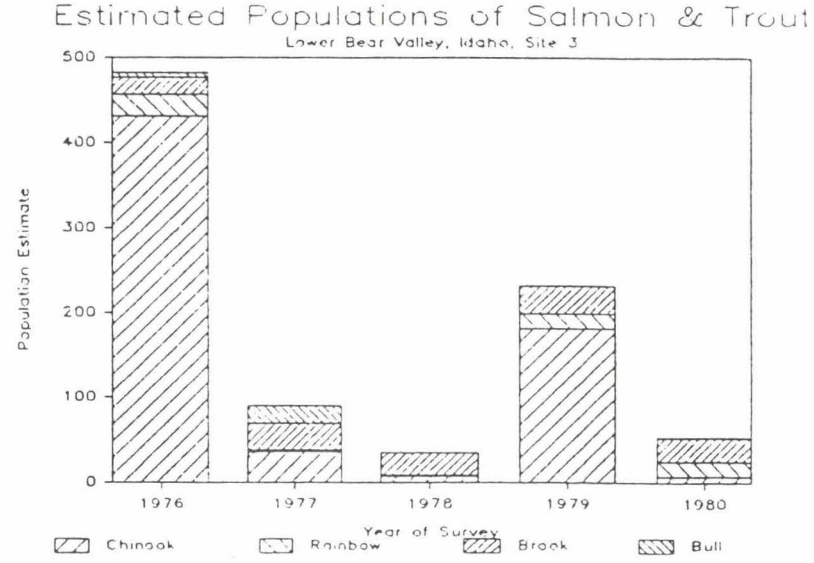
USDA Forest Service. 1972. The nation's range resources: a forest-range environmental study. Forest Resource Report No. 19.

USDA Forest Service. 1980. An assessment of the forest and rangeland situation in the United States. Document for presentation to Congress as required by the Forest and Rangeland Renewable Resource Planning Act (RPA) of 1974 as amended by the National Forest and Management Act of 1976. FS-345.

USDA Forest Service. (n.d.). Bear Valley range history. Information to Bear Valley Study Team. Unpublished report on file, USDA Forest Service, Intermountain Forest and Range Experiment Station, Forestry Sciences Laboratory, Boise, Idaho.


Estimated Populations of Salmon & Trout
Lower Bear Valley, Idaho, Site 1
Population Estimate
450
400
350
300
250
200
150
100
50
0
1976
1977
1978
1979
1980
Year of Survey
Chinook
Rainbow
Brook
Bull


Estimated Populations of Salmon & Trout
Lower Bear Valley, Idaho, Site 2
Population Estimate
500
400
300
200
100
0
1976
1977
1978
1979
1980
Year of Survey
Chinook
Rainbow
Brook
Bull

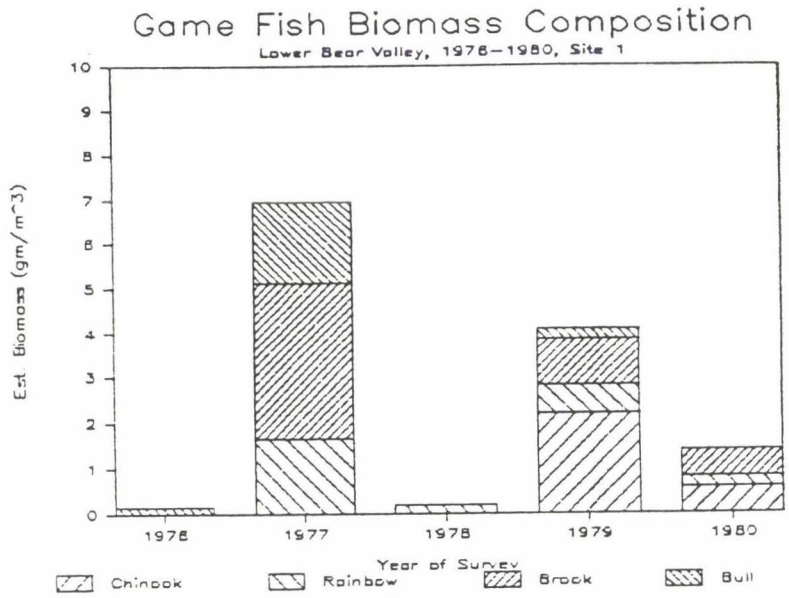

Estimated Populations of Salmon & Trout
Lower Bear Valley, Idaho, Site 3
Population Estimate
500
400
300
200
100
0
1976
1977
1978
1979
1980
Year of Survey
Chinook
Rainbow
Brook
Bull

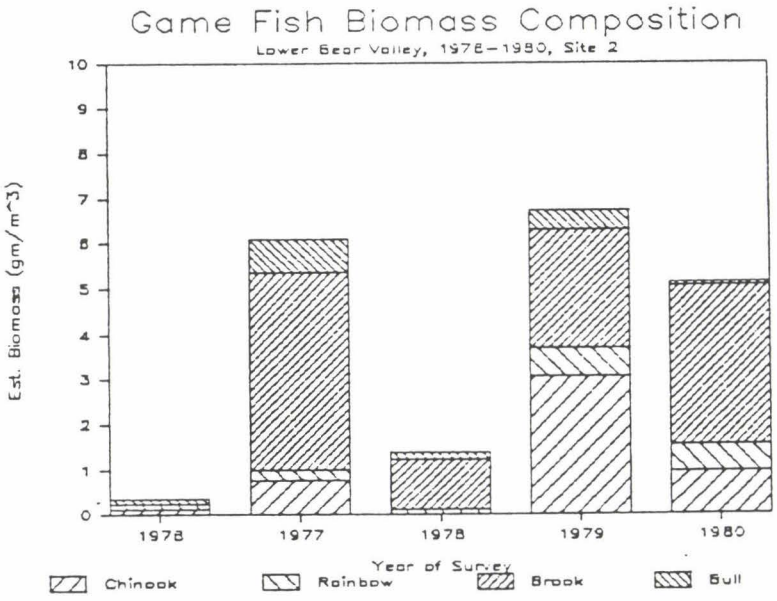
APPENDIX 5

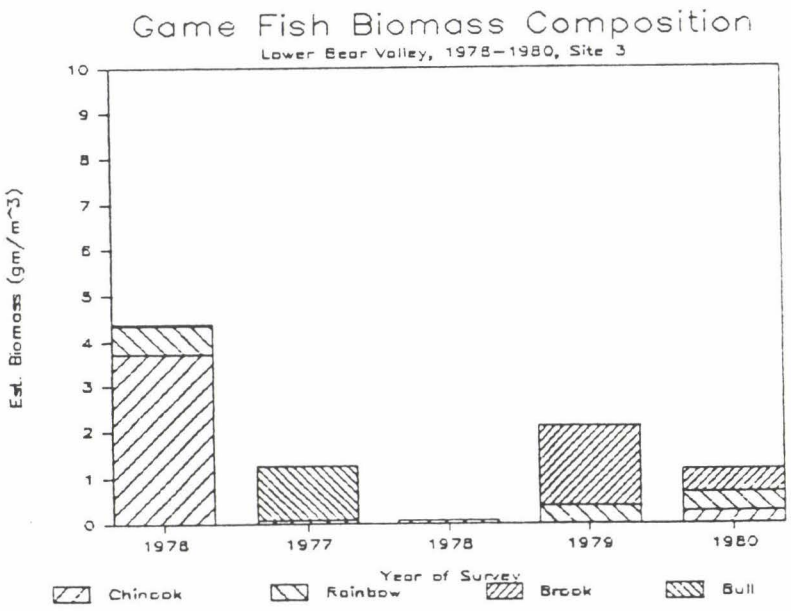
Supplemental fish population analysis graphs for Lower Bear Valley.

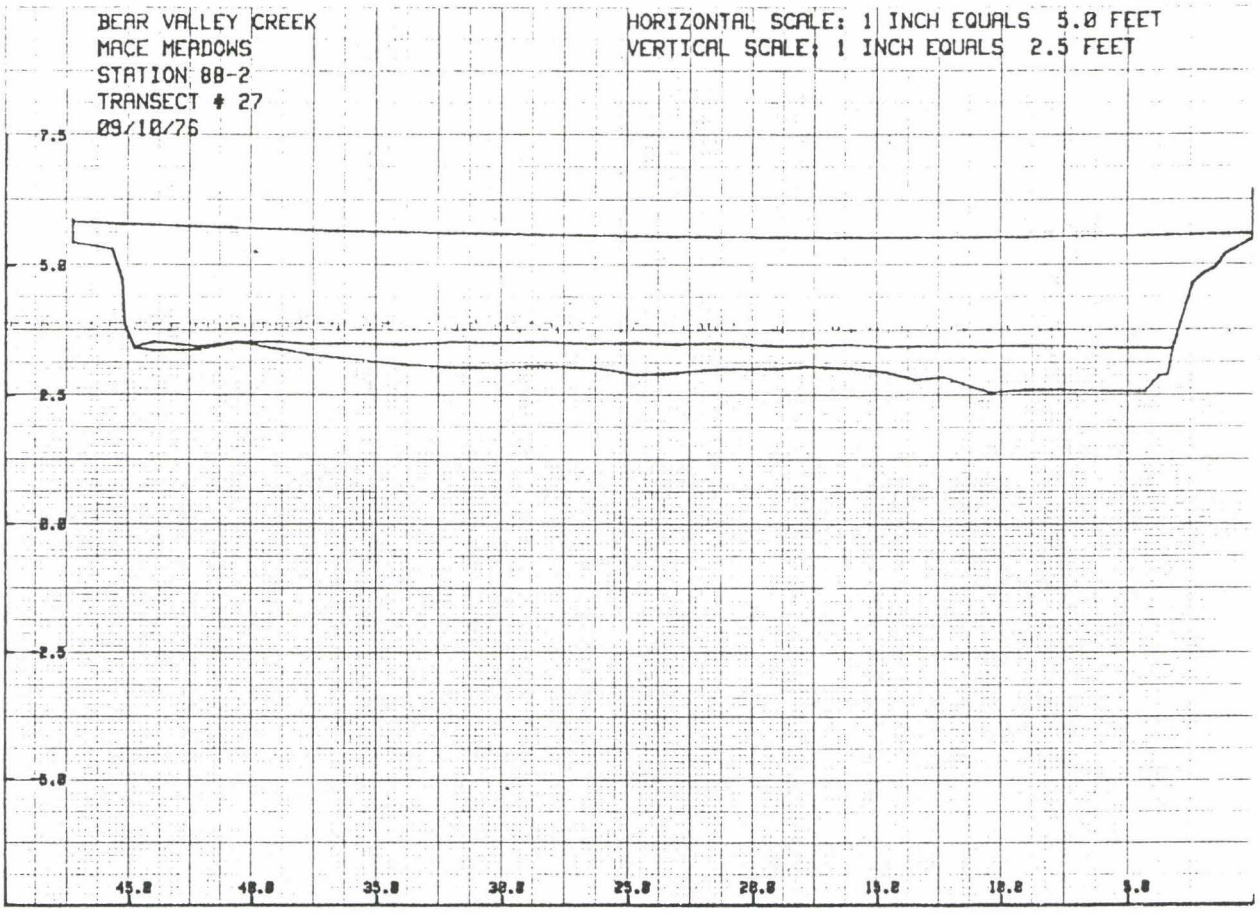
APPENDIX 6

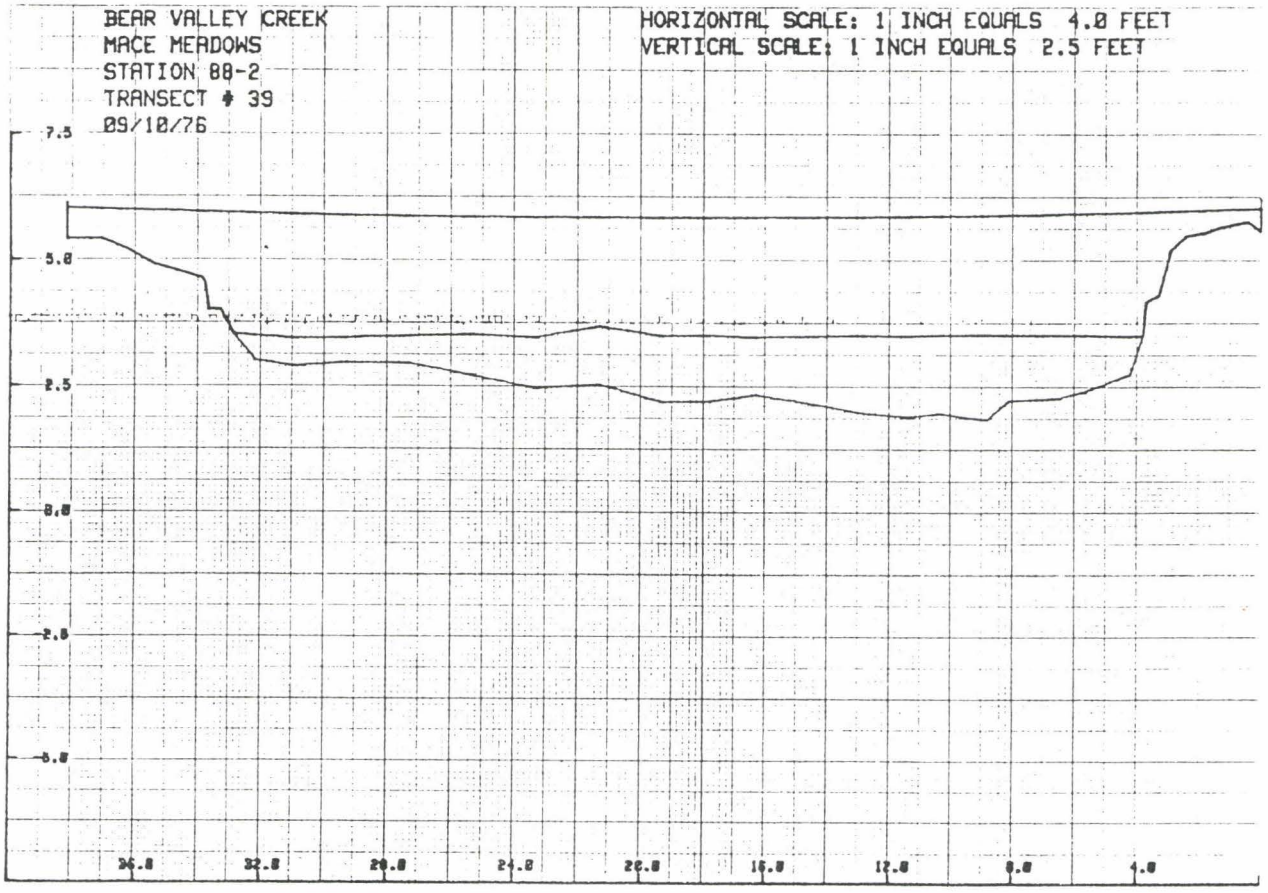
Hydrologic cross section profiles, Lower Bear Valley, Idaho, 1976-1979.

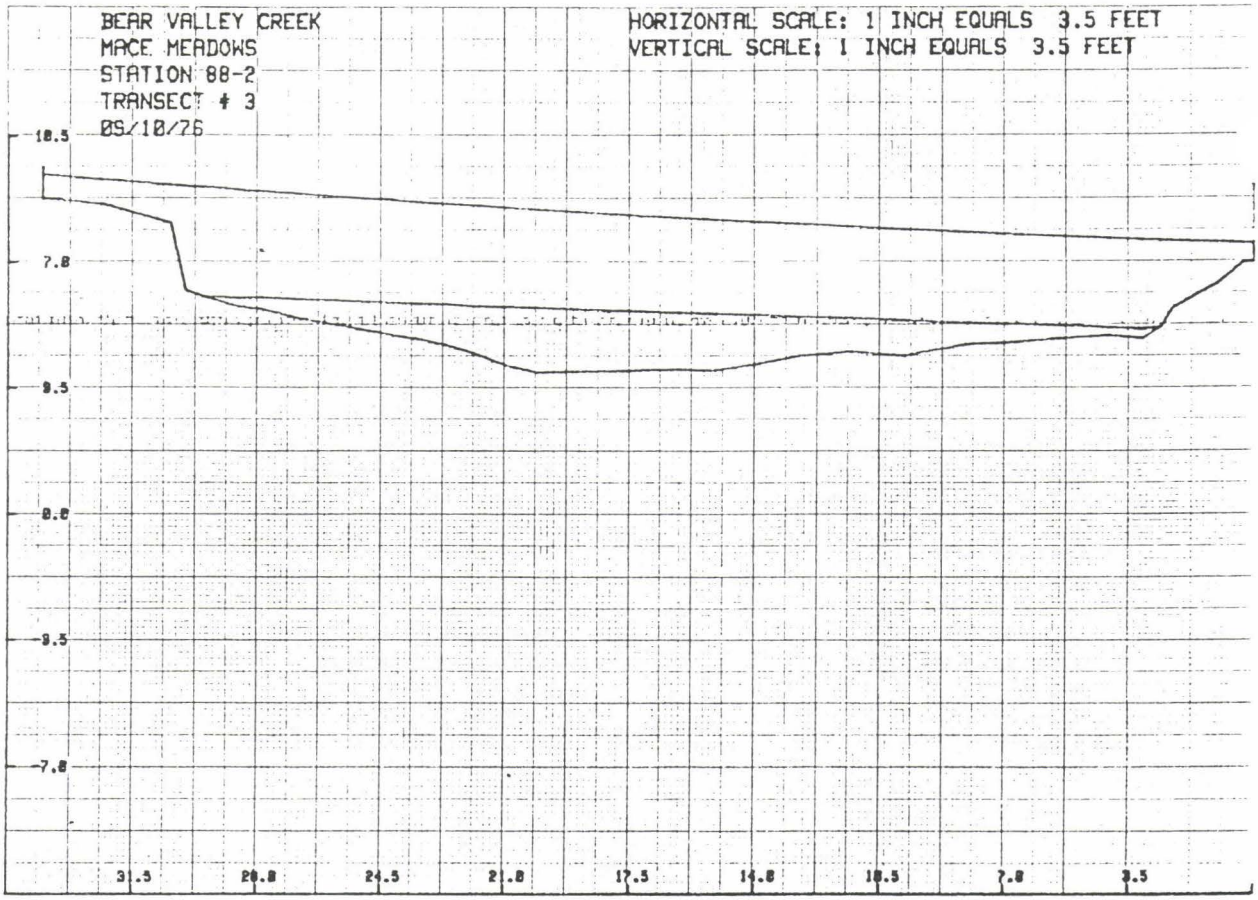

Game Fish Biomass Composition
Lower Bear Valley, 1978–1980, Site 1
Est. Biomass (gm/m^3)
0
1
2
3
4
5
6
7
8
9
10
1978
1977
1978
1979
1980
Year of Survey
Chinook
Rainbow
Brook
Bull

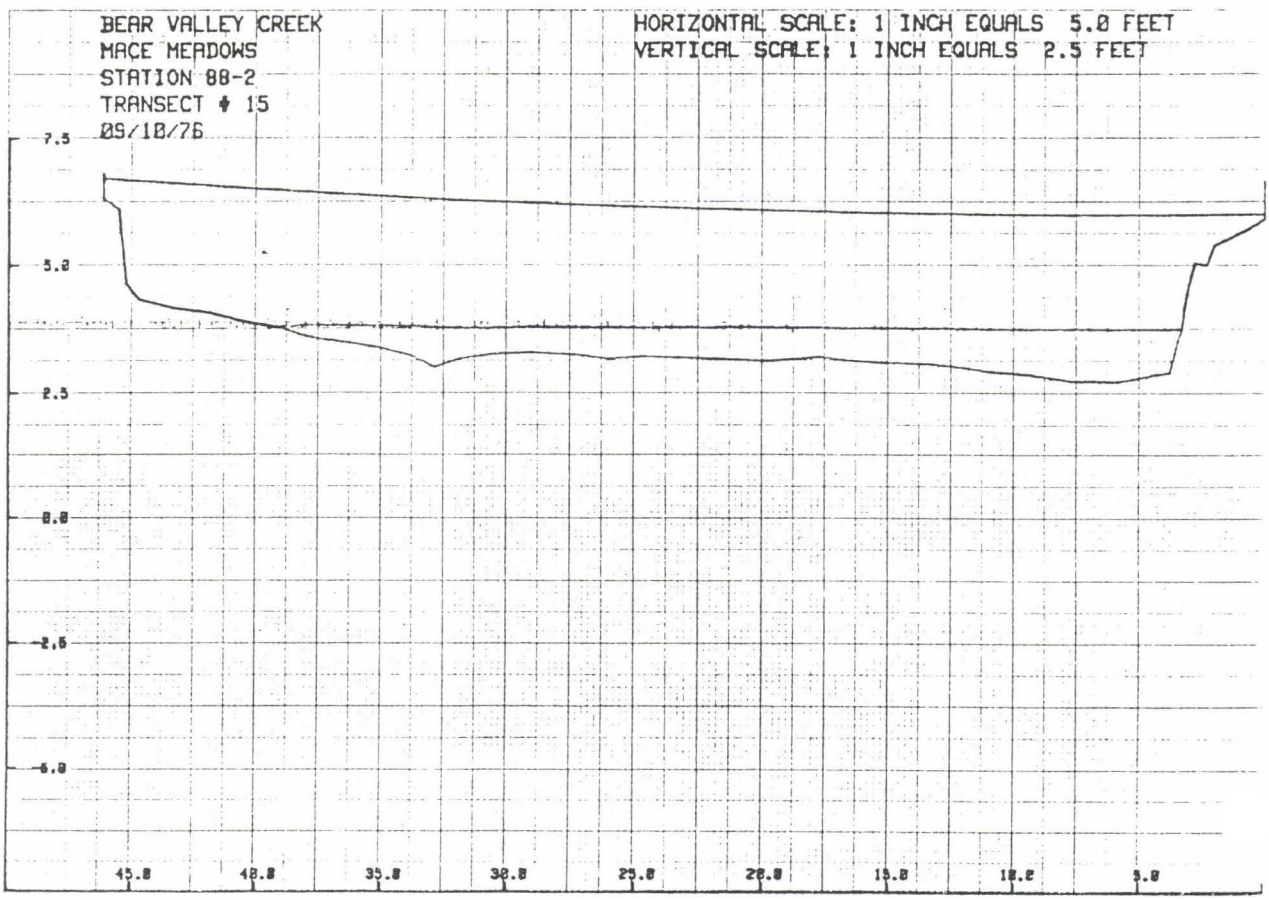

Game Fish Biomass Composition
Lower Bear Valley, 1978–1980, Site 2
Est. Biomass (gm/m^3)
0
1
2
3
4
5
6
7
8
9
10
1978
1977
1978
1979
1980
Year of Survey
Chinook
Rainbow
Brook
Bull

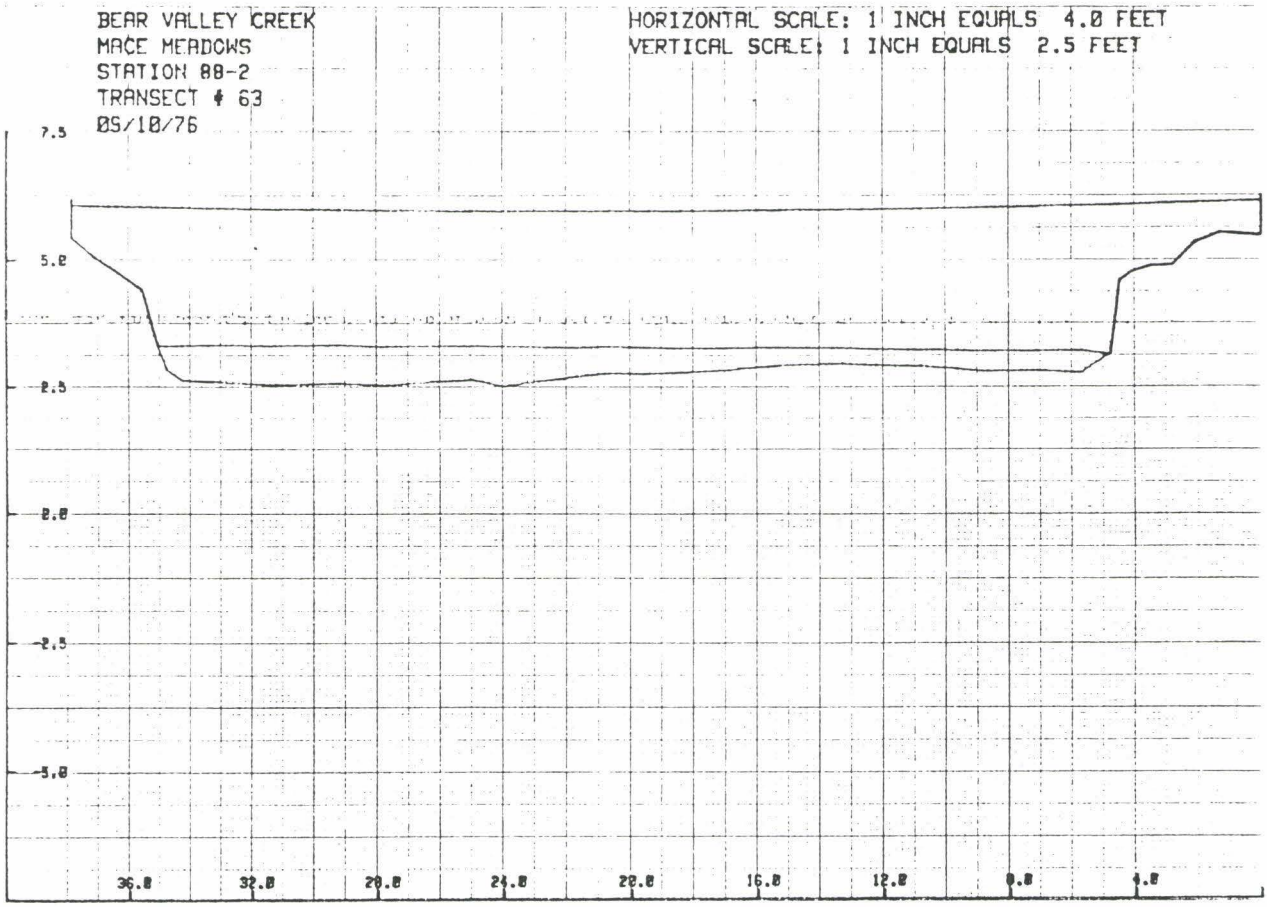

Game Fish Biomass Composition
Lower Bear Valley, 1978–1980, Site 3
Est. Biomass (gm/m^3)
0
1
2
3
4
5
6
7
8
9
10
1978
1977
1978
1979
1980
Year of Survey
Chinook
Rainbow
Brook
Bull

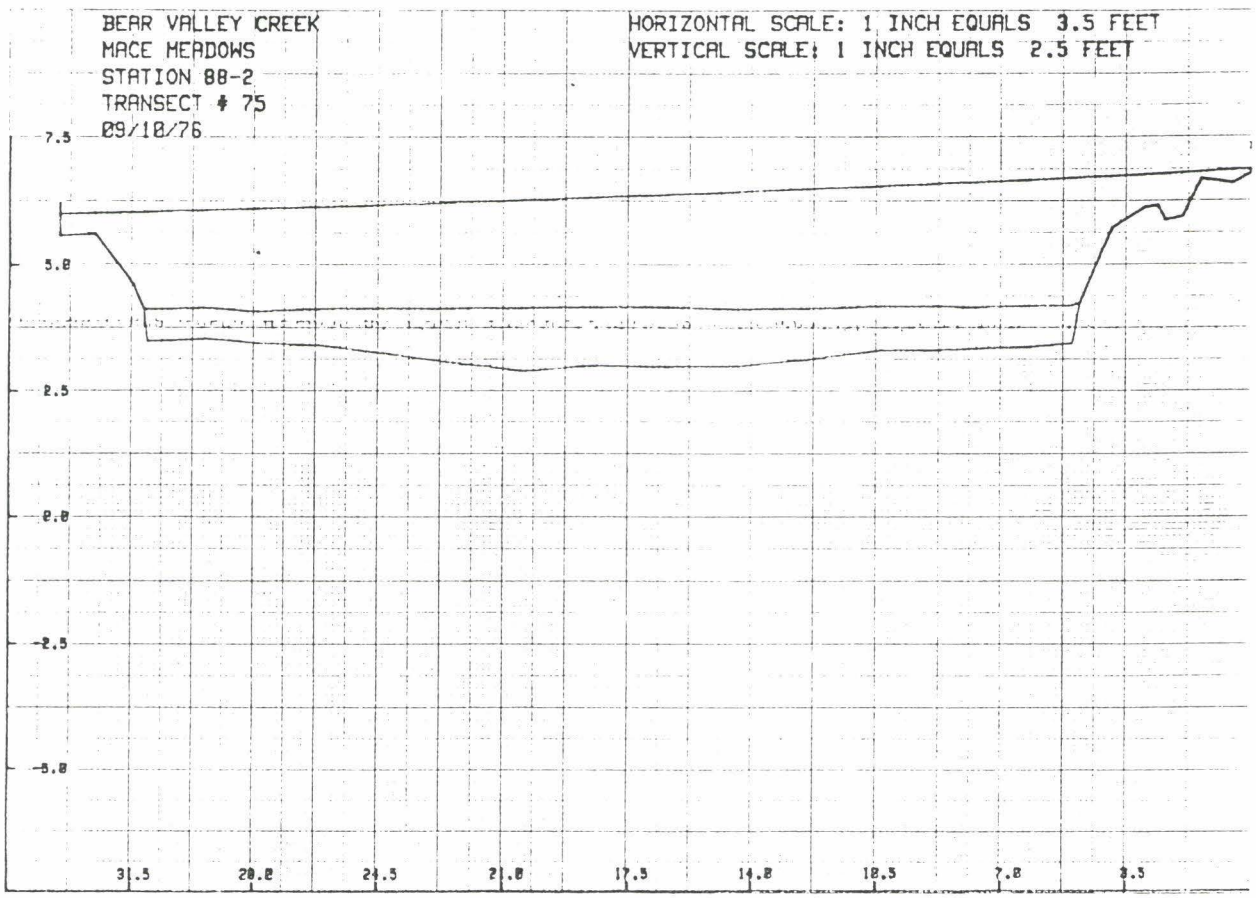

BEAR VALLEY CREEK
MACE MEADOWS
STATION 88-2
TRANSECT # 27
09/10/76
HORIZONTAL SCALE: 1 INCH EQUALS 5.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0


BEAR VALLEY CREEK
MACE MEADOWS
STATION 88-2
TRANSECT # 39
09/10/76
HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
36.0
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0


BEAR VALLEY CREEK
MACE MEADOWS
STATION 88-2
TRANSECT # 3
09/10/76
HORIZONTAL SCALE: 1 INCH EQUALS 3.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 3.5 FEET
18.5
7.8
9.5
8.0
-3.5
-7.8
31.5
28.0
24.5
21.0
17.5
14.0
10.5
7.0
3.5

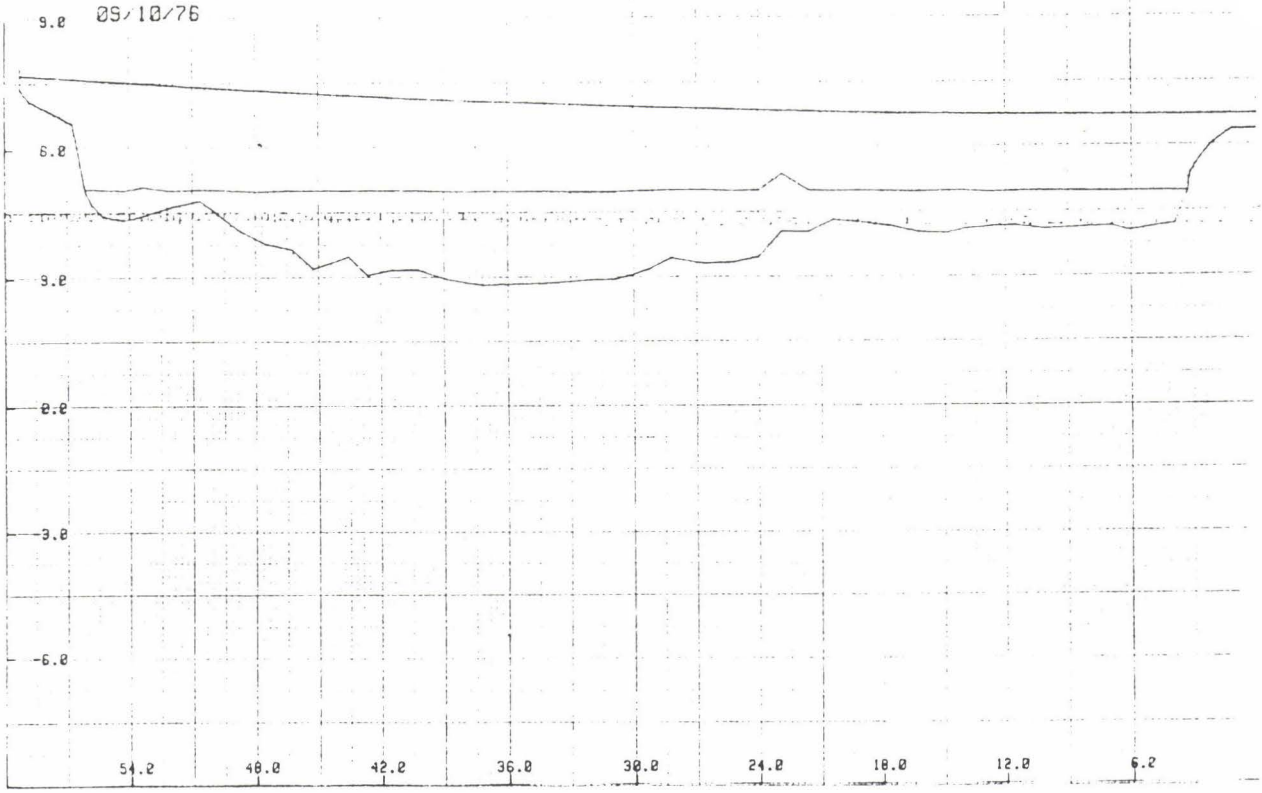

BEAR VALLEY CREEK
MACE MEADOWS
STATION 88-2
TRANSECT # 15
09/10/76
HORIZONTAL SCALE: 1 INCH EQUALS 5.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0

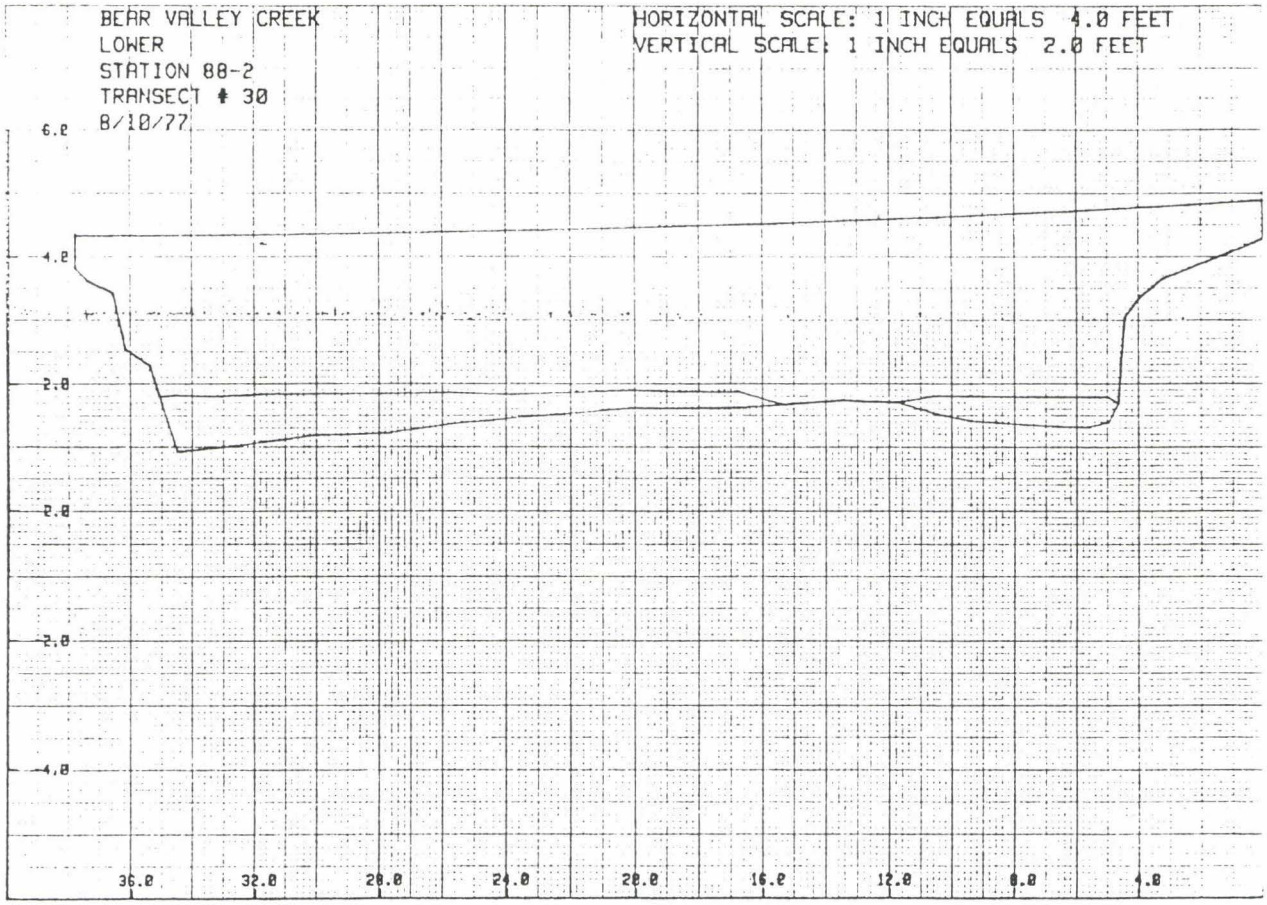

BEAR VALLEY CREEK
MACE MEADOWS
STATION 88-2
TRANSECT # 63
09/10/76
HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
36.0
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0

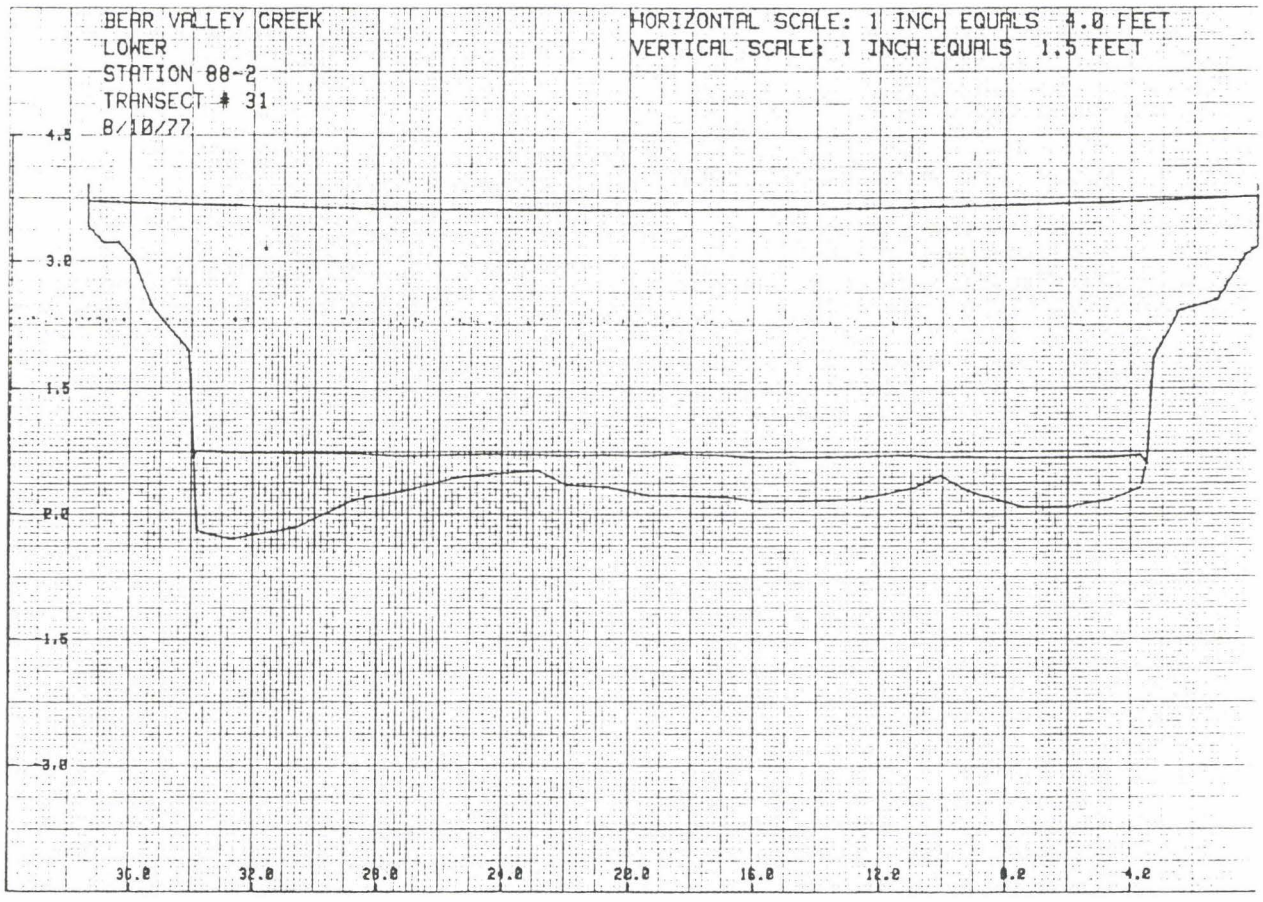

BEAR VALLEY CREEK
MACE MEADOWS
STATION 88-2
TRANSECT # 75
09/10/76
HORIZONTAL SCALE: 1 INCH EQUALS 3.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
31.5
28.0
24.5
21.0
17.5
14.0
10.5
7.0
3.5

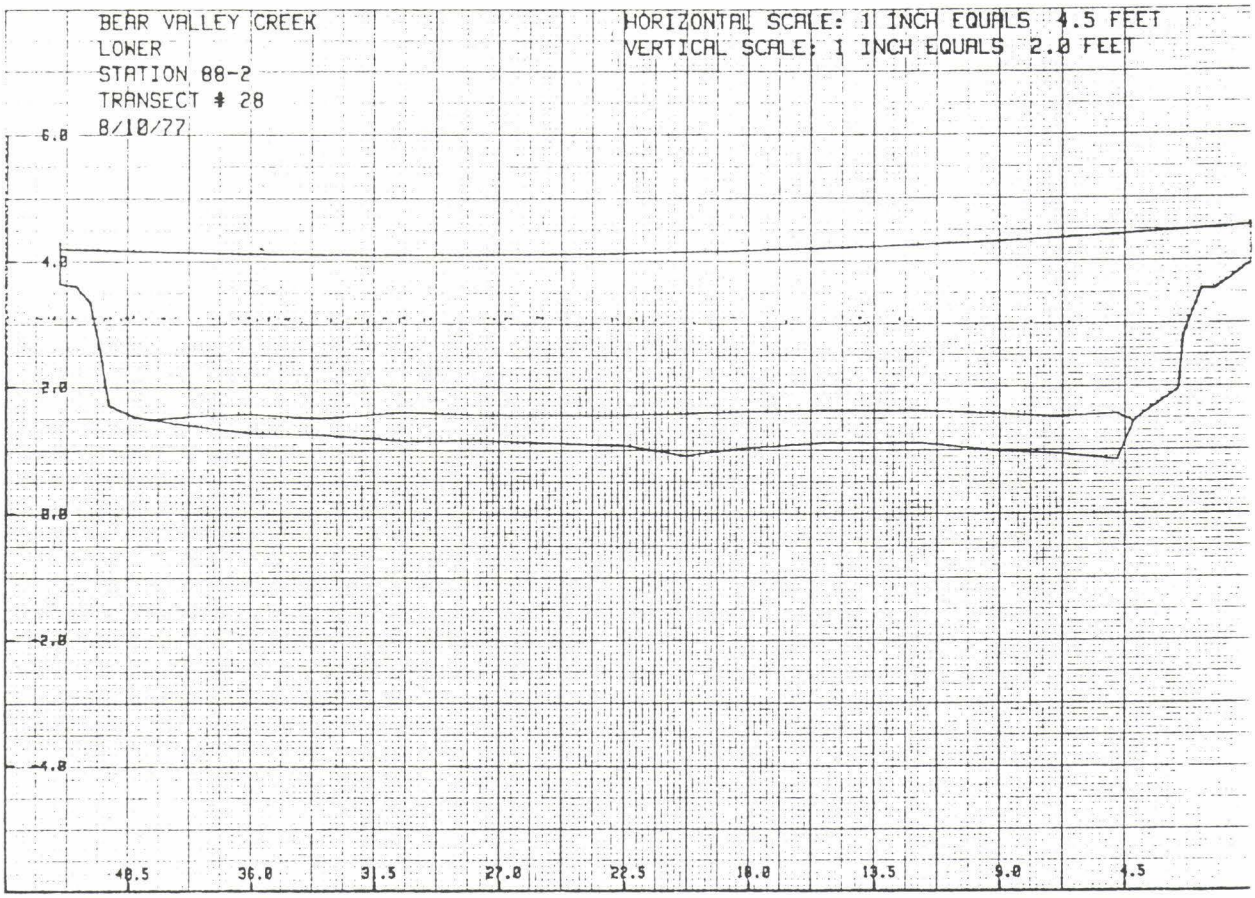
BEAR VALLEY CREEK
MACE MEADOWS
STATION 88-2
TRANSECT # 51
09/10/76

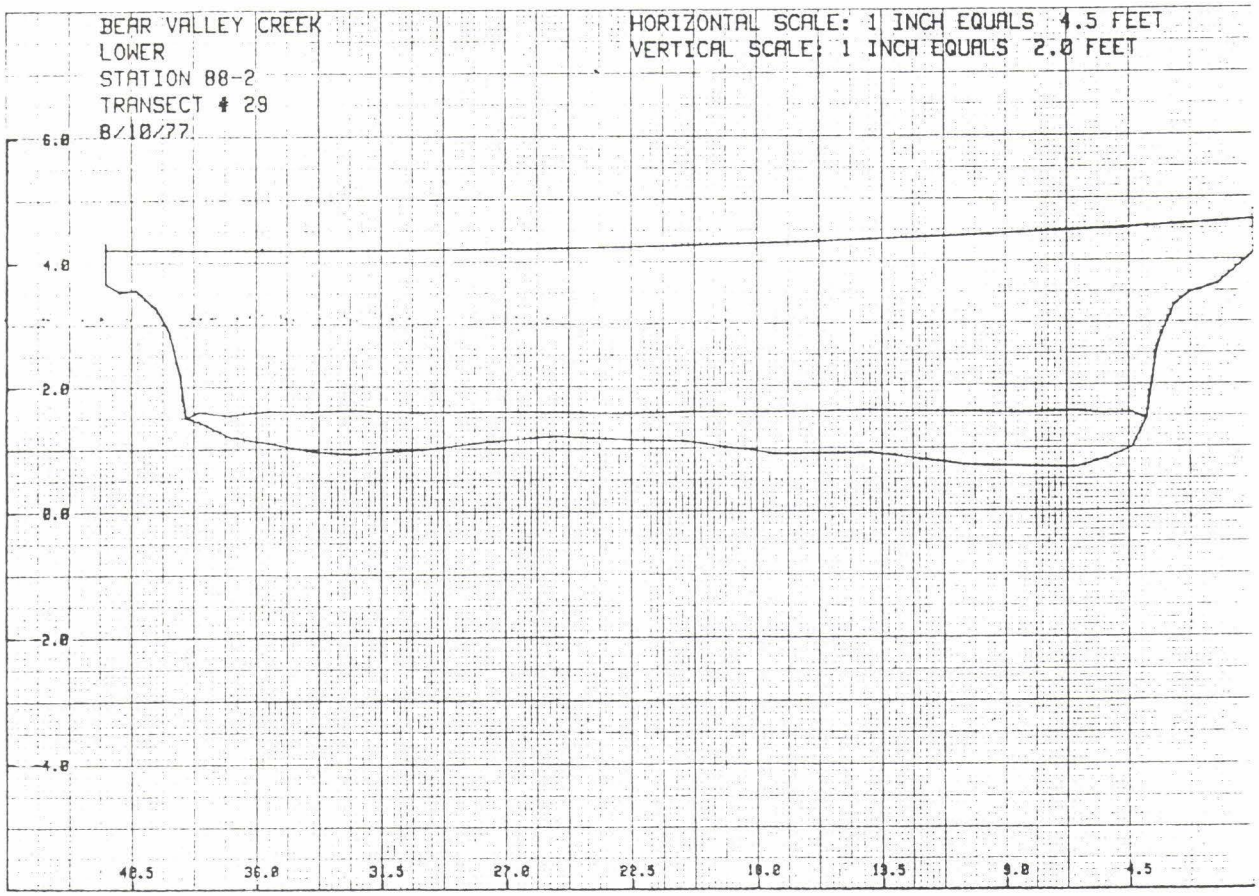
HORIZONTAL SCALE: 1 INCH EQUALS 6.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 3.0 FEET

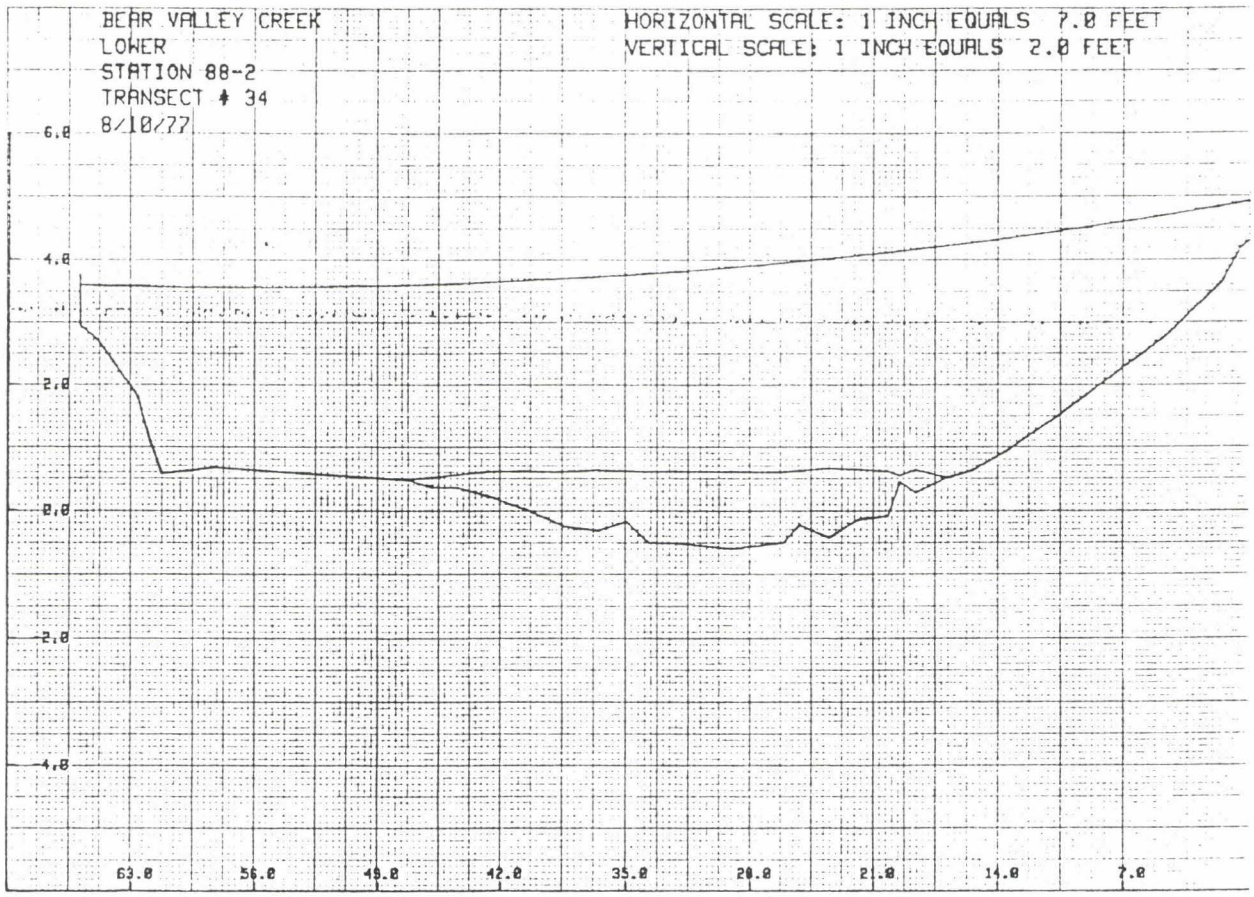


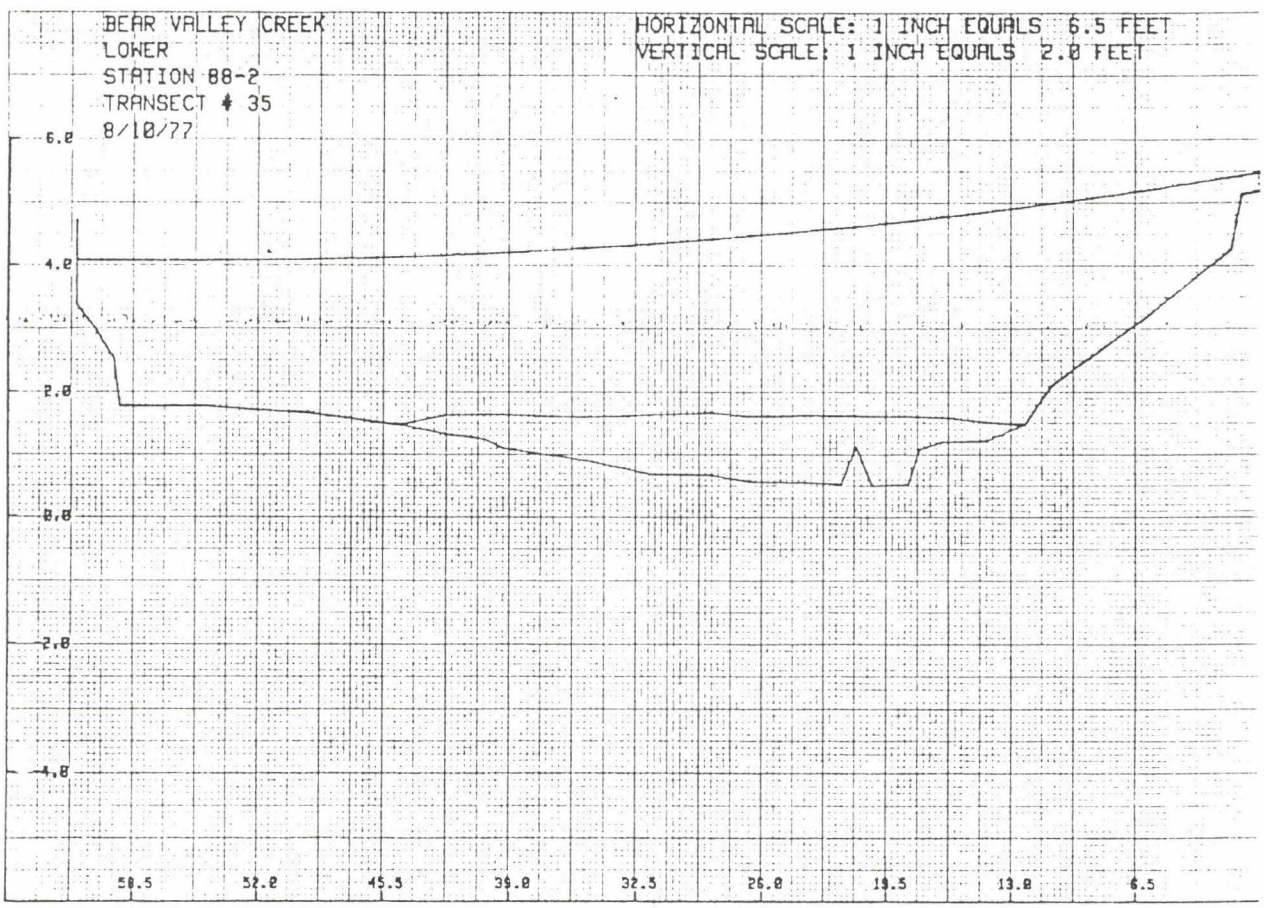

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 30
8/10/77
HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
36.0
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0

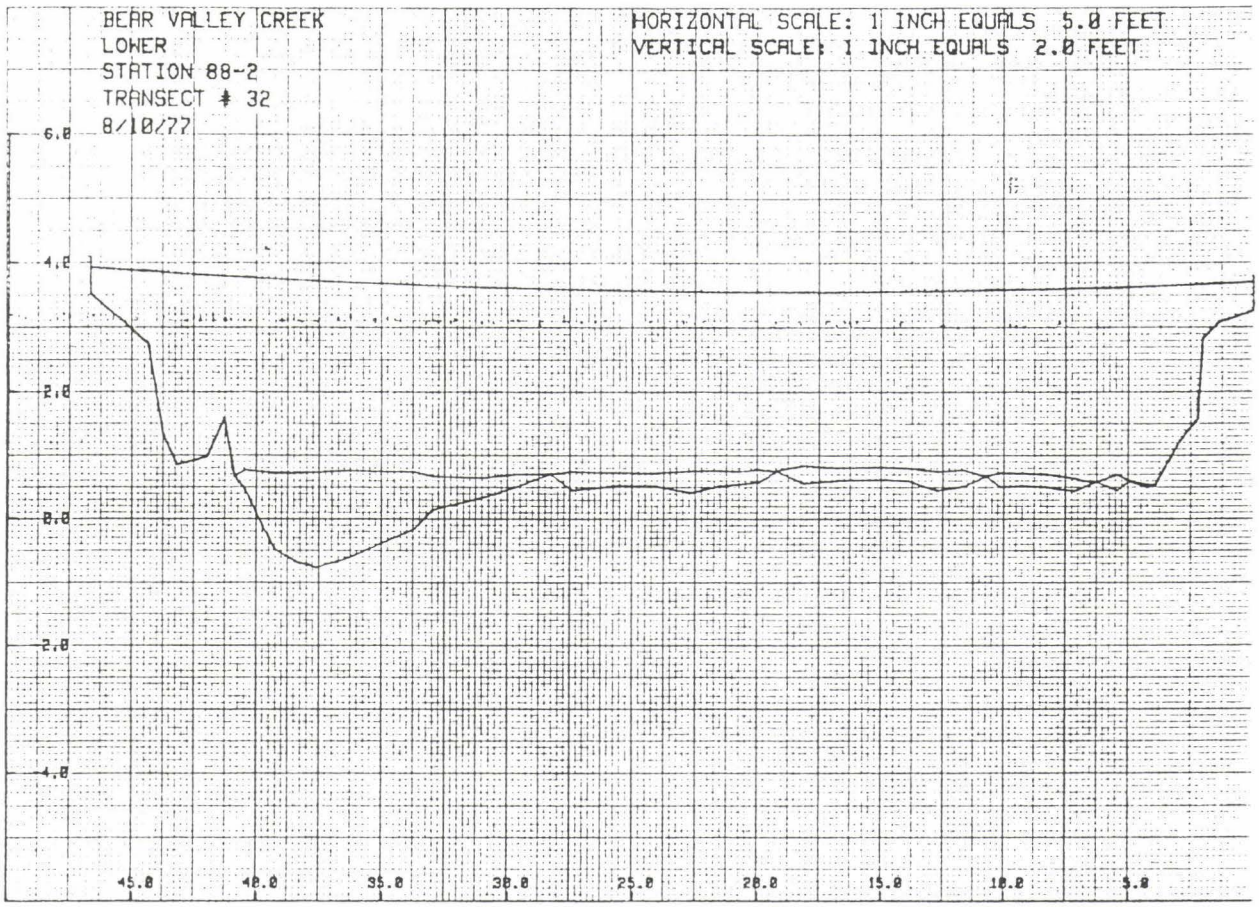

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 31
8/10/77
HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 1.5 FEET
4.5
3.0
1.5
0.0
-1.5
-3.0
36.0
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0

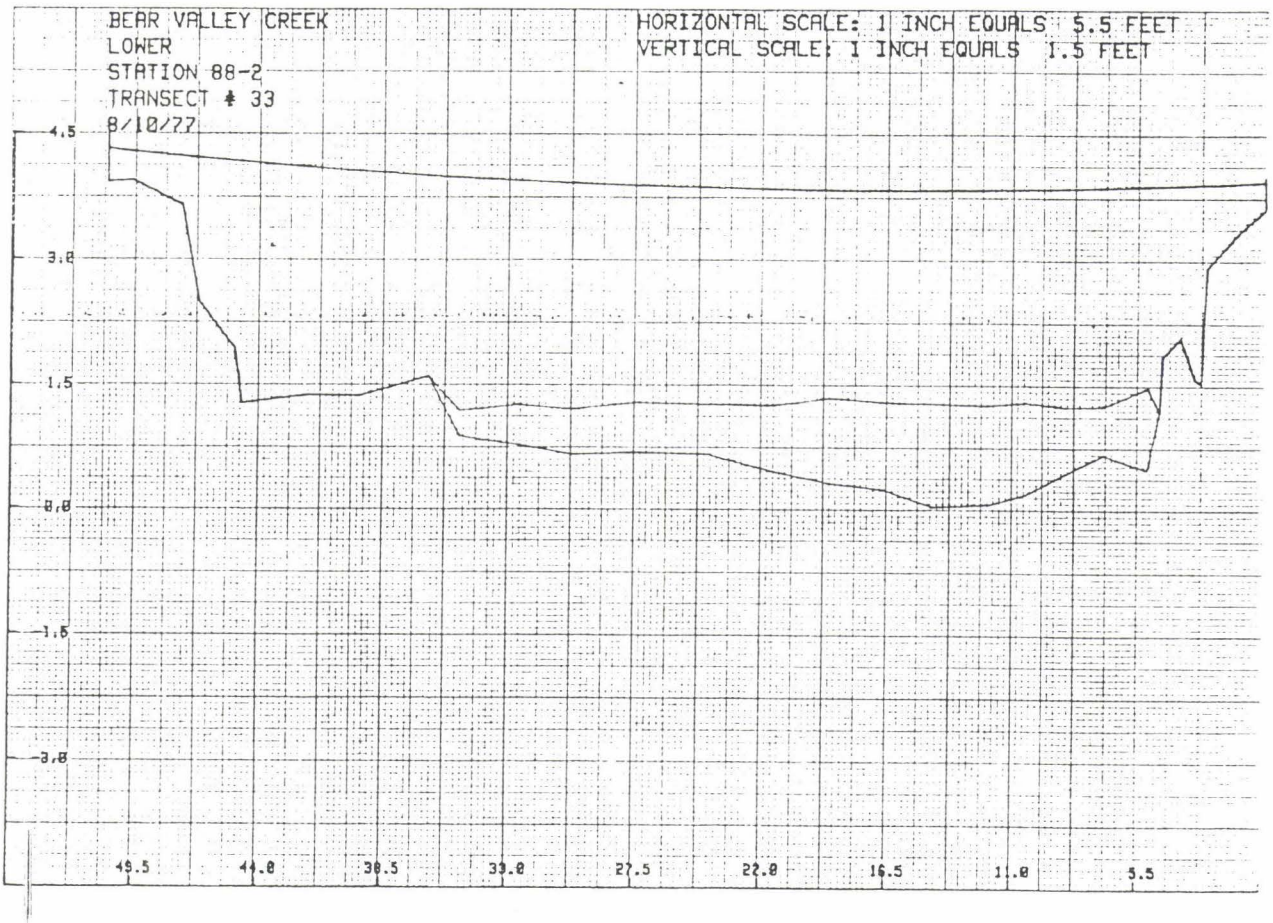

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 28
8/10/77
HORIZONTAL SCALE: 1 INCH EQUALS 4.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
40.5
36.0
31.5
27.0
22.5
18.0
13.5
9.0
4.5

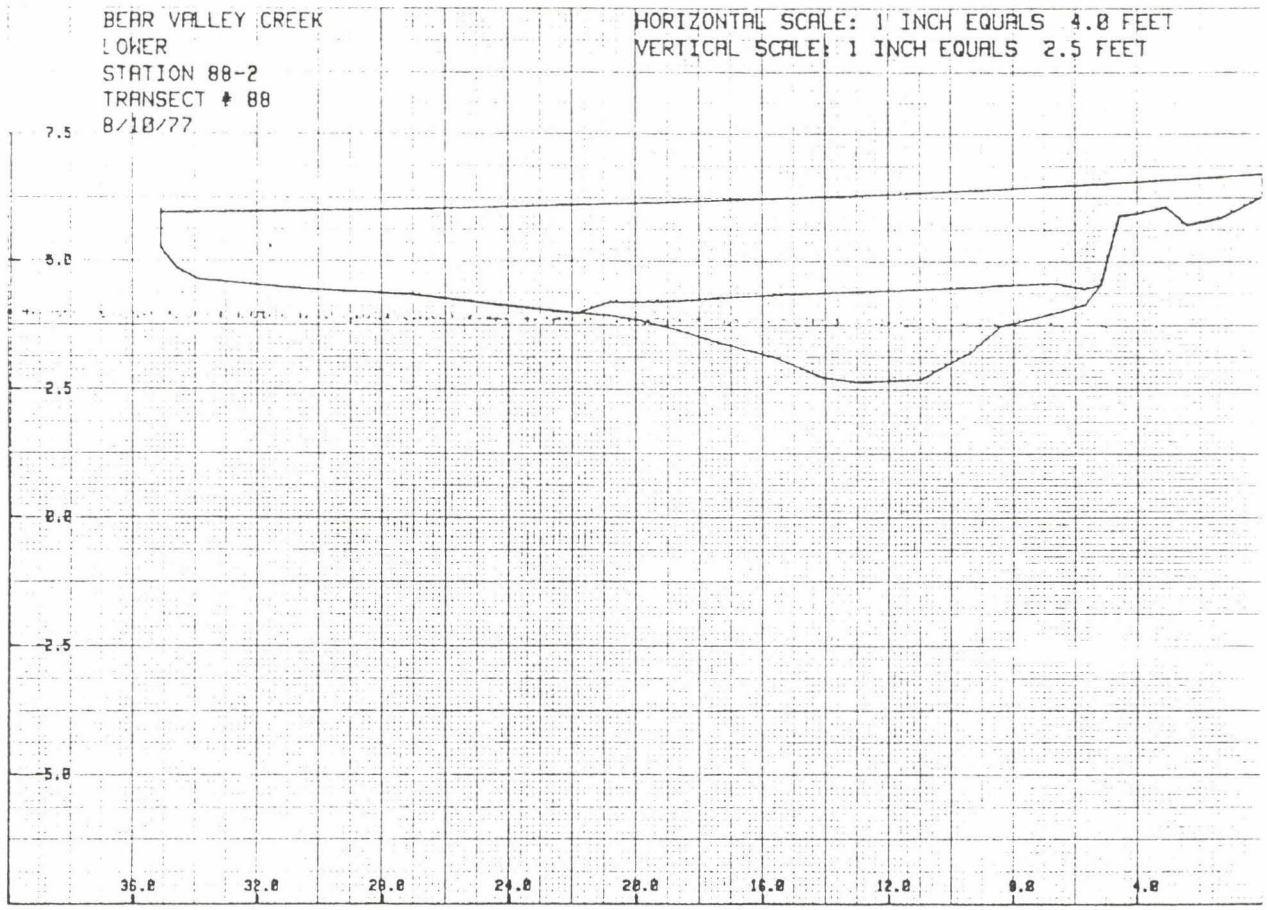

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 29
8/10/77
HORIZONTAL SCALE: 1 INCH EQUALS 4.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
40.5
36.0
31.5
27.0
22.5
18.0
13.5
9.0
4.5

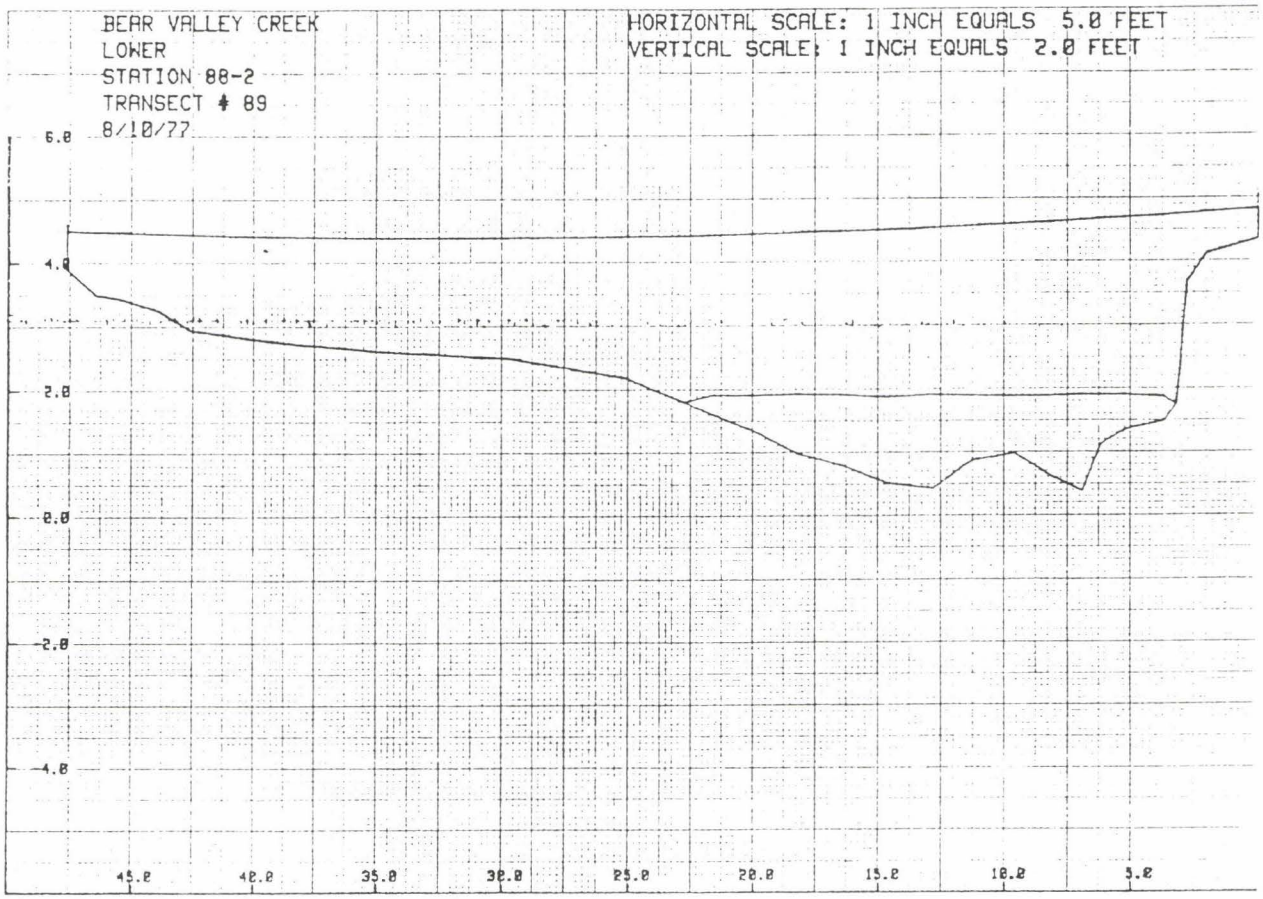

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 34
8/10/77
HORIZONTAL SCALE: 1 INCH EQUALS 7.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
63.0
56.0
49.0
42.0
35.0
28.0
21.0
14.0
7.0

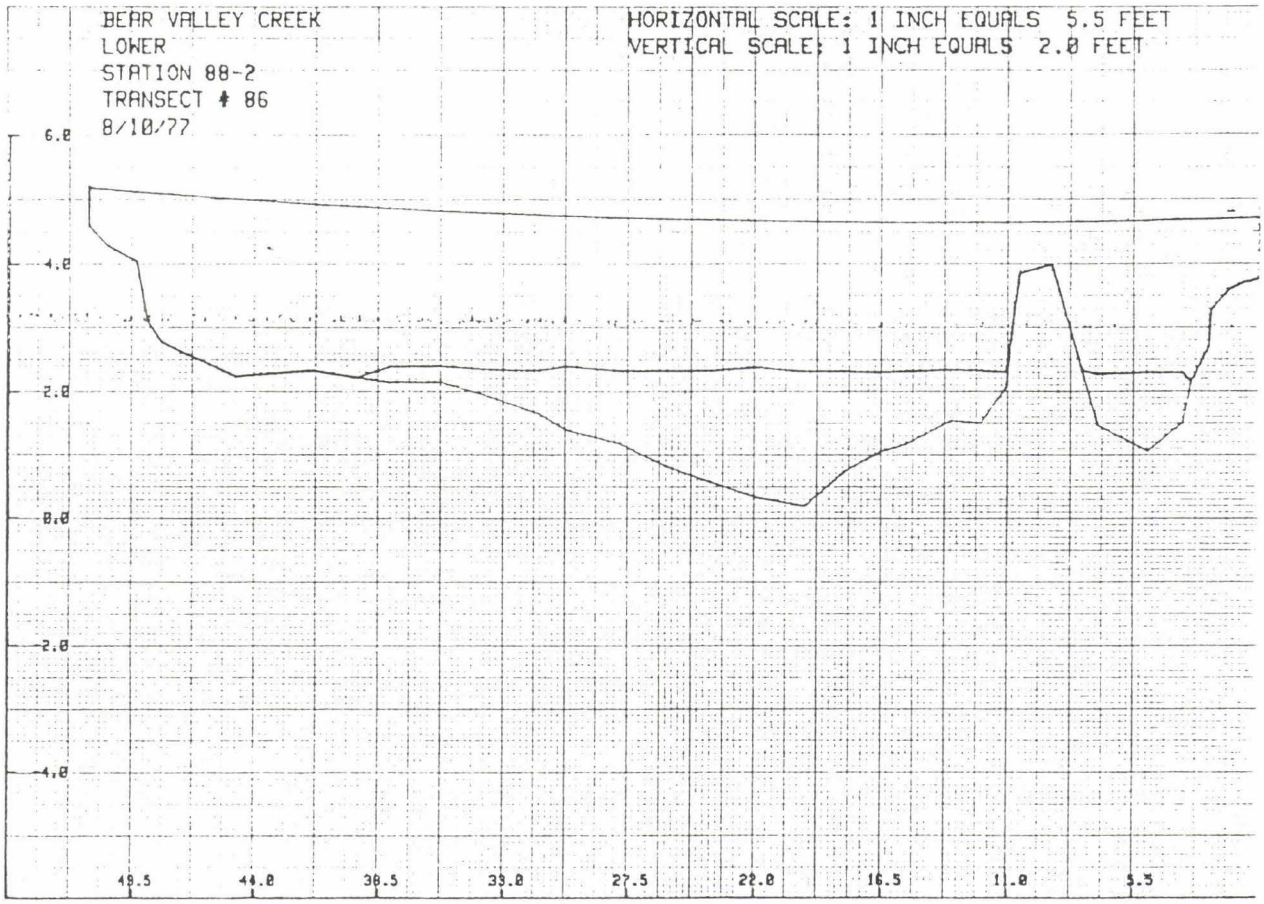

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 35
8/10/77
HORIZONTAL SCALE: 1 INCH EQUALS 6.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
58.5
52.0
45.5
39.0
32.5
26.0
19.5
13.0
6.5

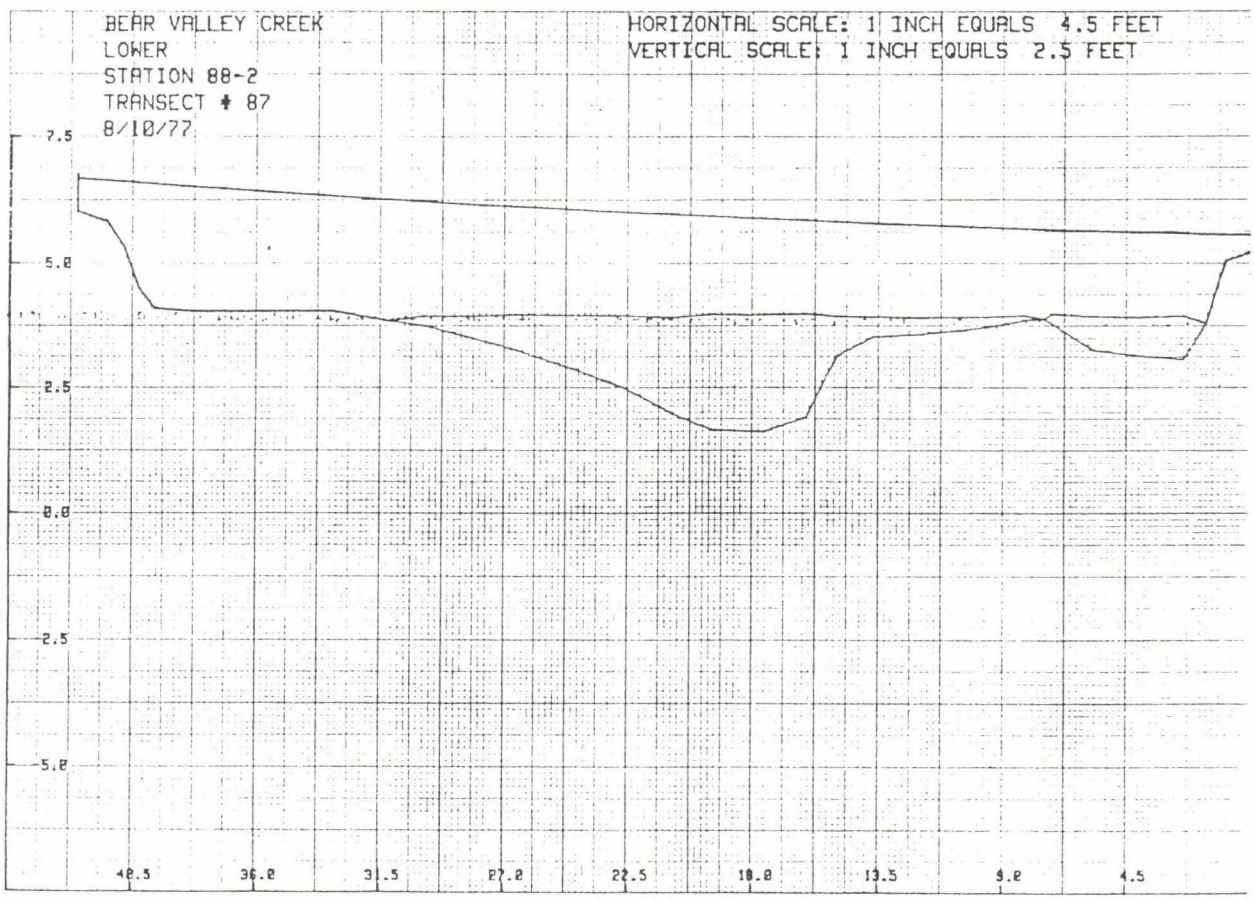

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 32
8/10/77
HORIZONTAL SCALE: 1 INCH EQUALS 5.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0

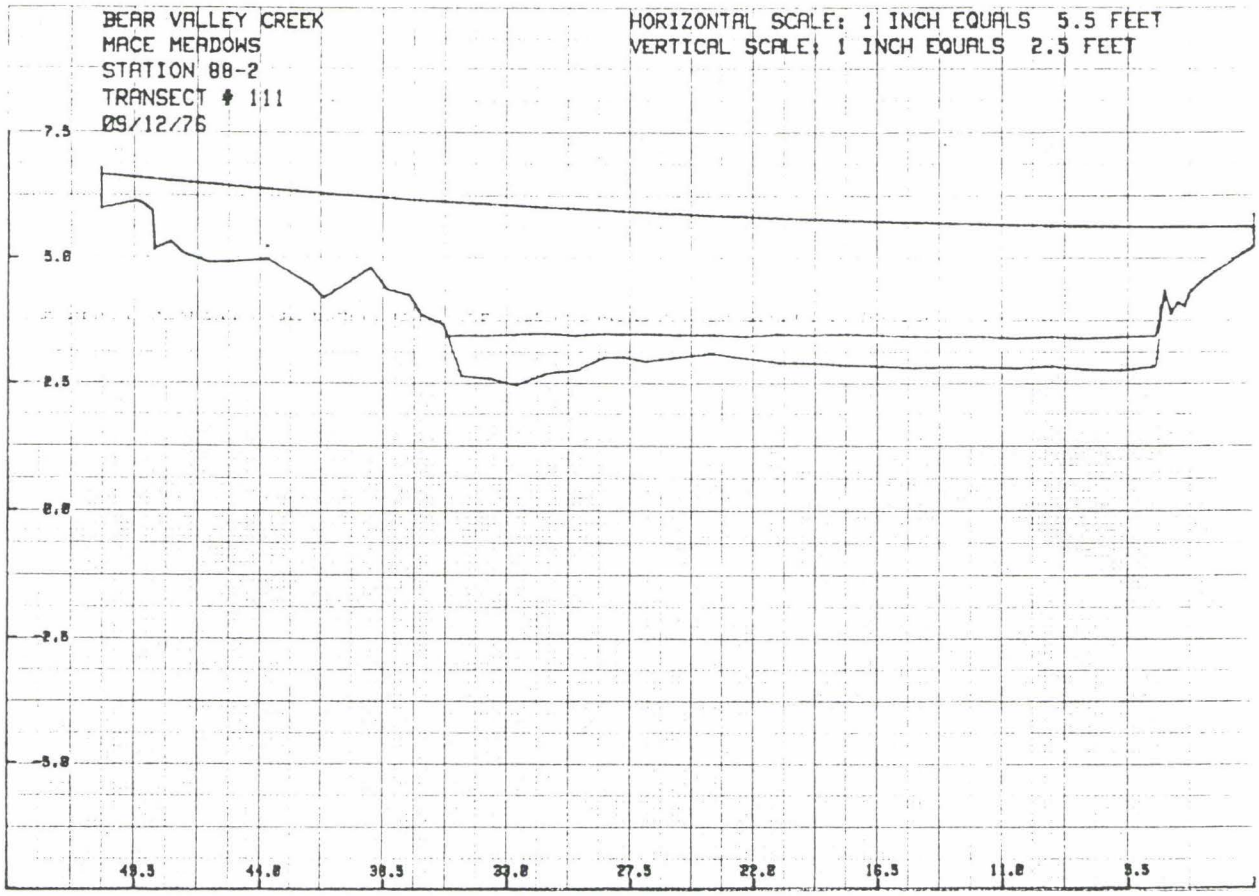

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 33
8/10/77
HORIZONTAL SCALE: 1 INCH EQUALS 5.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 1.5 FEET
4.5
3.0
1.5
0.0
-1.5
-3.0
49.5
44.0
38.5
33.0
27.5
22.0
16.5
11.0
5.5

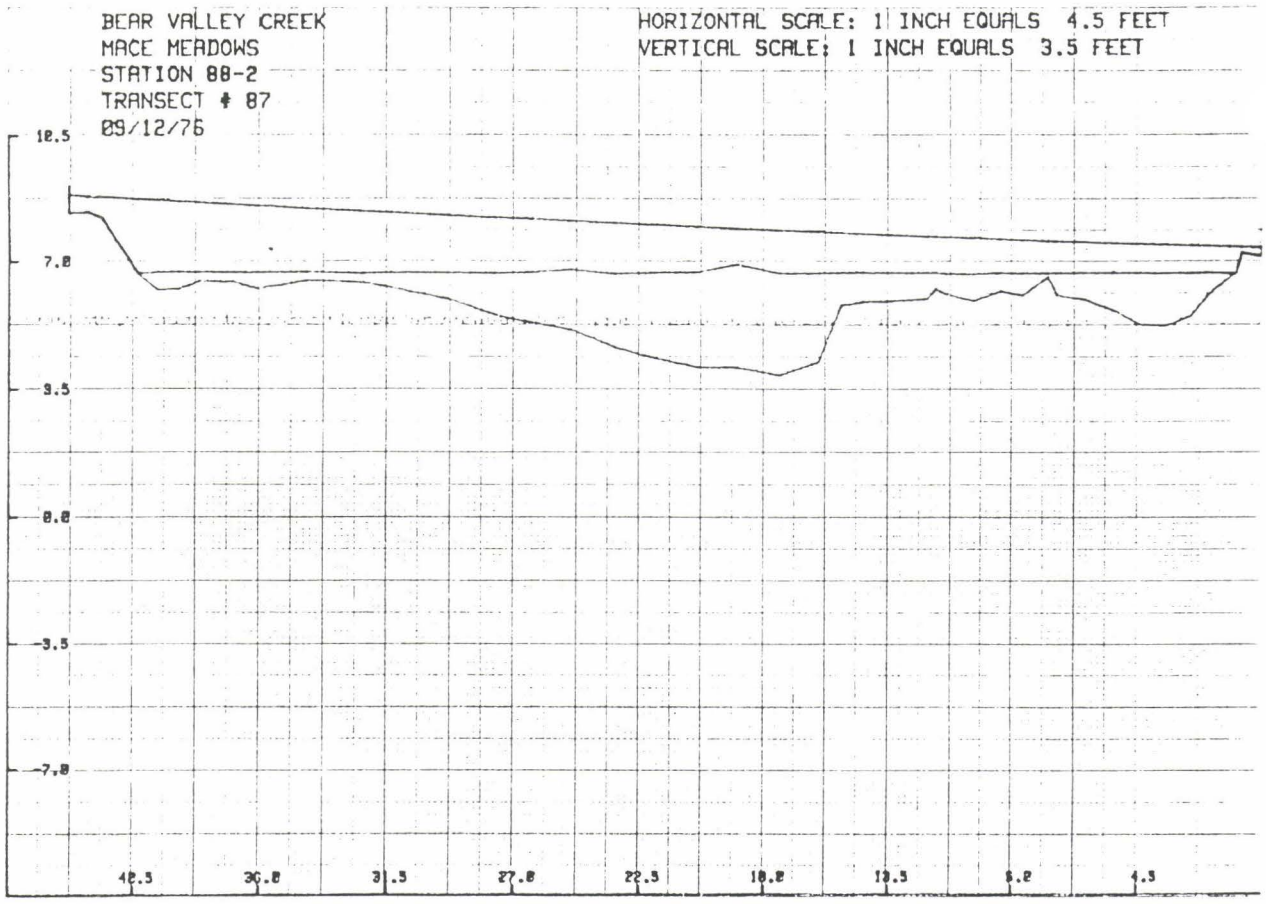

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 88
8/10/77
HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
36.0
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0

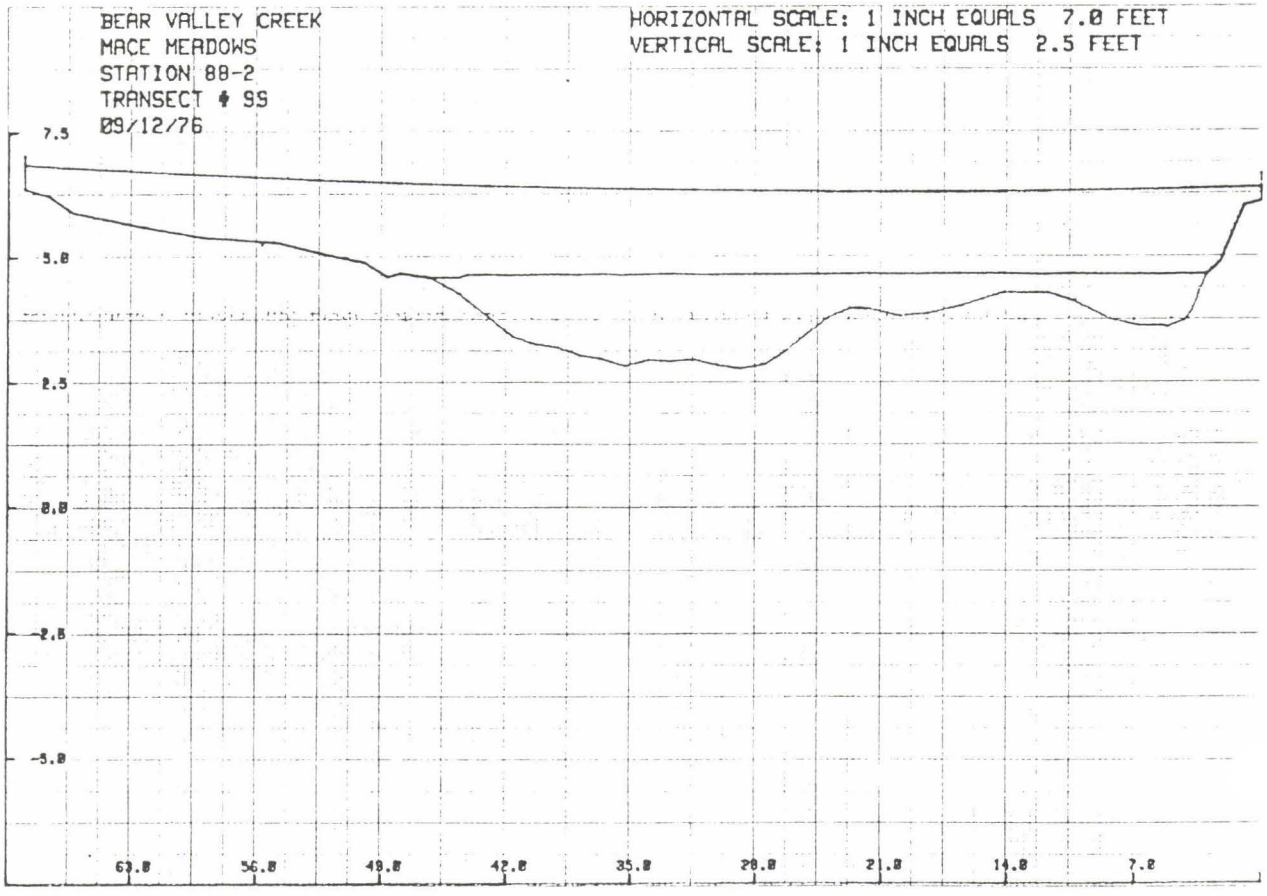

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 89
8/10/77
HORIZONTAL SCALE: 1 INCH EQUALS 5.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0


BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 86
8/10/77
HORIZONTAL SCALE: 1 INCH EQUALS 5.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
49.5
44.0
38.5
33.0
27.5
22.0
16.5
11.0
5.5


BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 87
8/10/77
HORIZONTAL SCALE: 1 INCH EQUALS 4.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
40.5
36.0
31.5
27.0
22.5
18.0
13.5
9.0
4.5

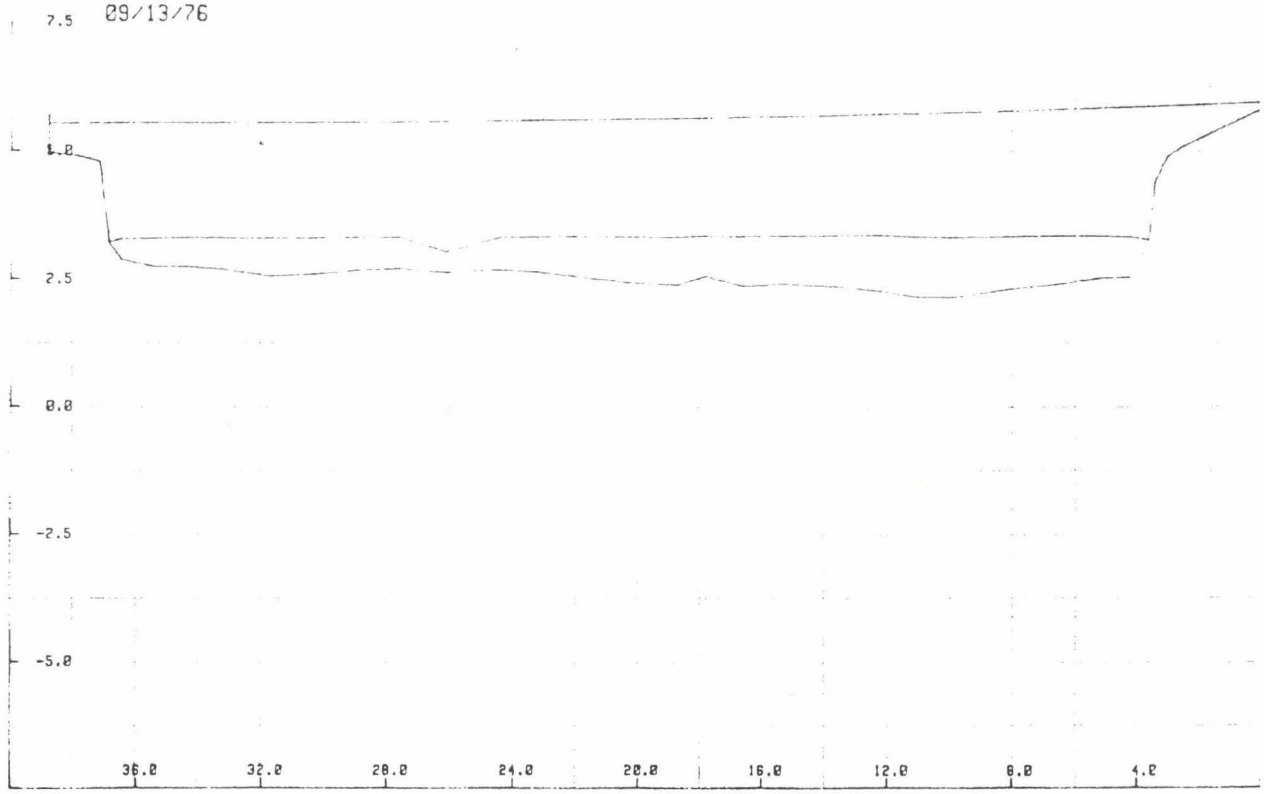

BEAR VALLEY CREEK
MACE MEADOWS
STATION 88-2
TRANSECT # 111
09/12/76
HORIZONTAL SCALE: 1 INCH EQUALS 5.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
49.5
44.0
38.5
33.0
27.5
22.0
16.5
11.0
5.5


BEAR VALLEY CREEK
MACE MEADOWS
STATION 88-2
TRANSECT # 87
09/12/76
HORIZONTAL SCALE: 1 INCH EQUALS 4.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 3.5 FEET
10.5
7.0
3.5
0.0
-3.5
-7.0
42.5
36.0
31.5
27.0
22.5
18.0
13.5
9.0
4.5


BEAR VALLEY CREEK
MACE MEADOWS
STATION 88-2
TRANSECT # SS
09/12/76
HORIZONTAL SCALE: 1 INCH EQUALS 7.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
63.0
56.0
49.0
42.0
35.0
28.0
21.0
14.0
7.0

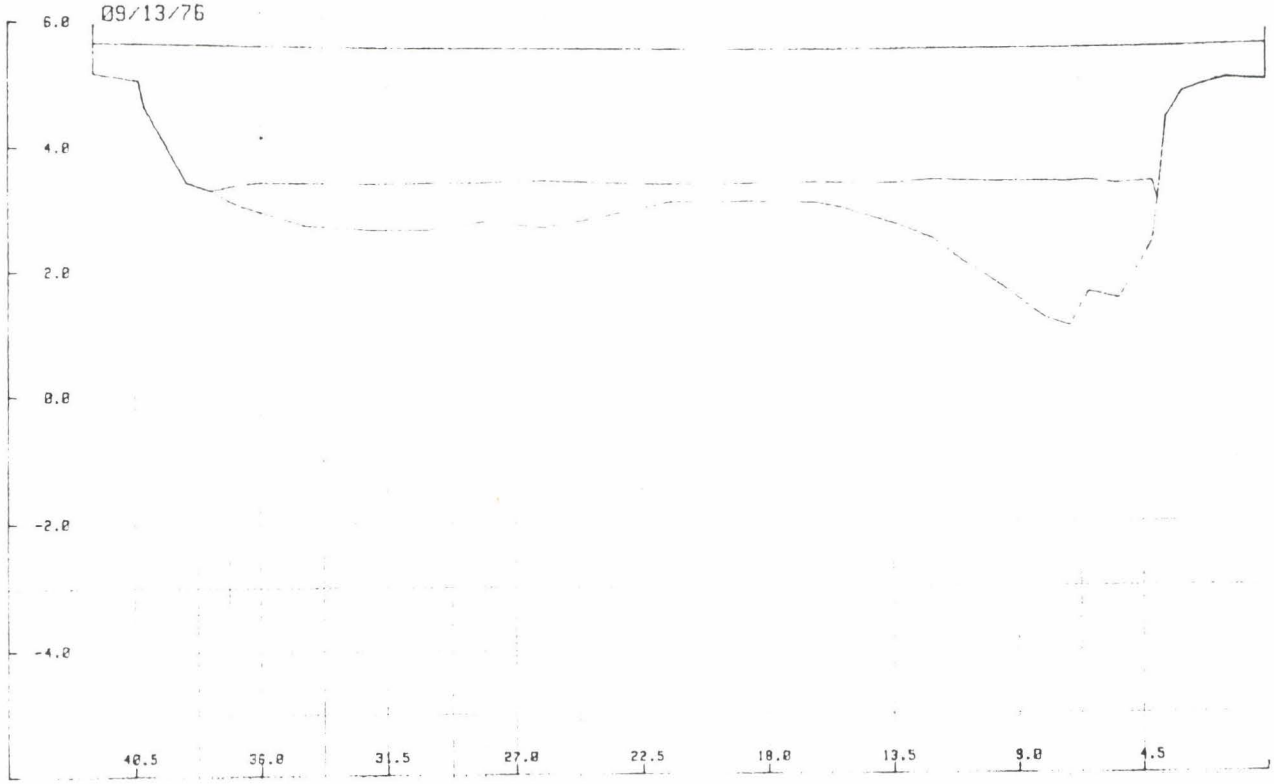
BEAR VALLEY CREEK
MACE MEADOWS
STATION 88-2
TRANSECT # 147
09/13/76

HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET



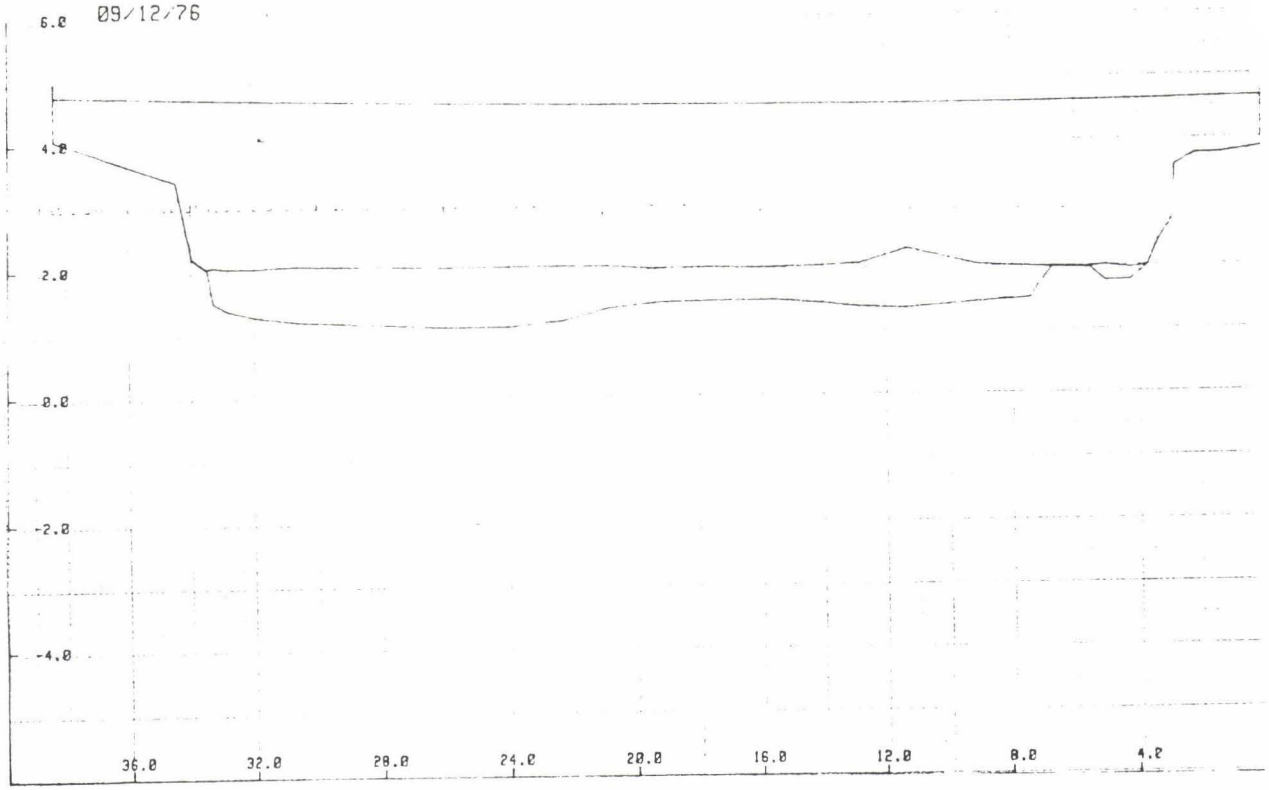
BEAR VALLEY CREEK
MACE MEADOWS
STATION 88-2
TRANSECT # 159
09/13/76

HORIZONTAL SCALE: 1 INCH EQUALS 4.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET



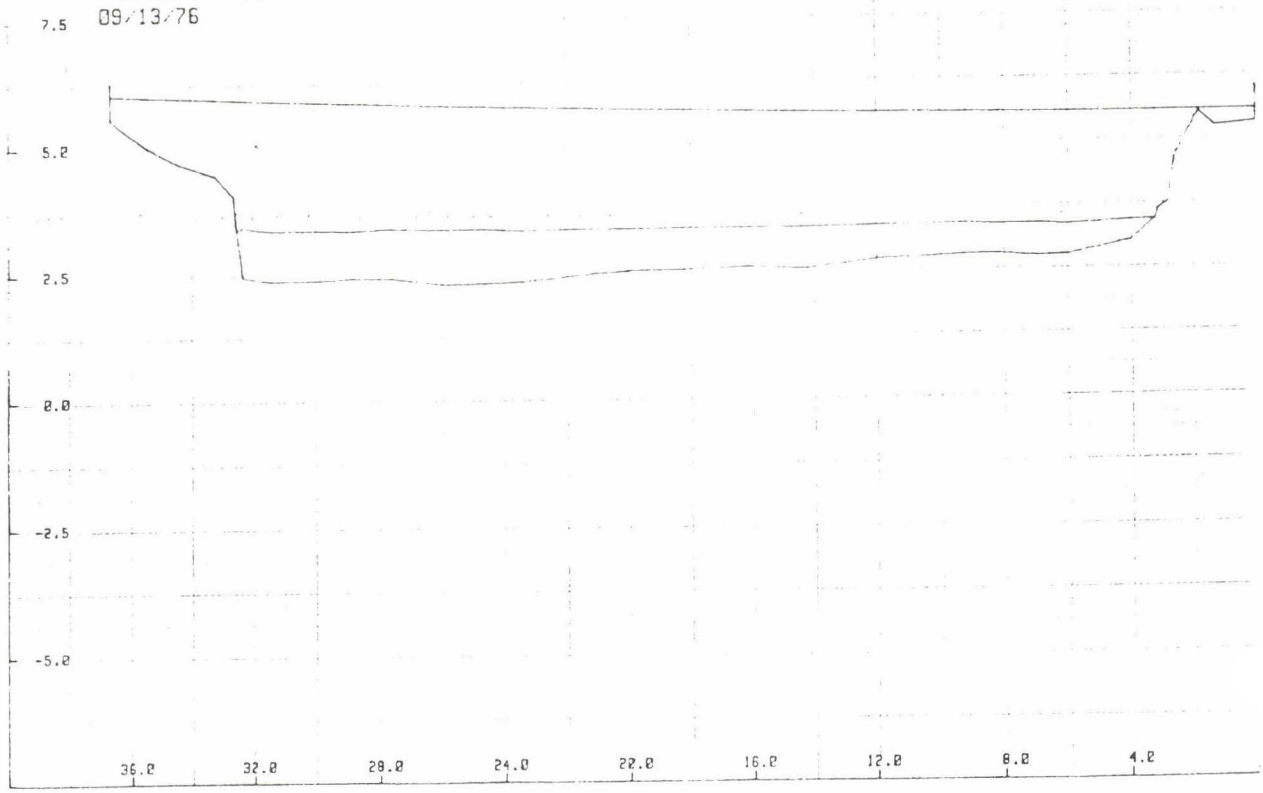
BEAR VALLEY CREEK
MACE MEADOWS
STATION 88-2
TRANSECT # 123
09/12/76

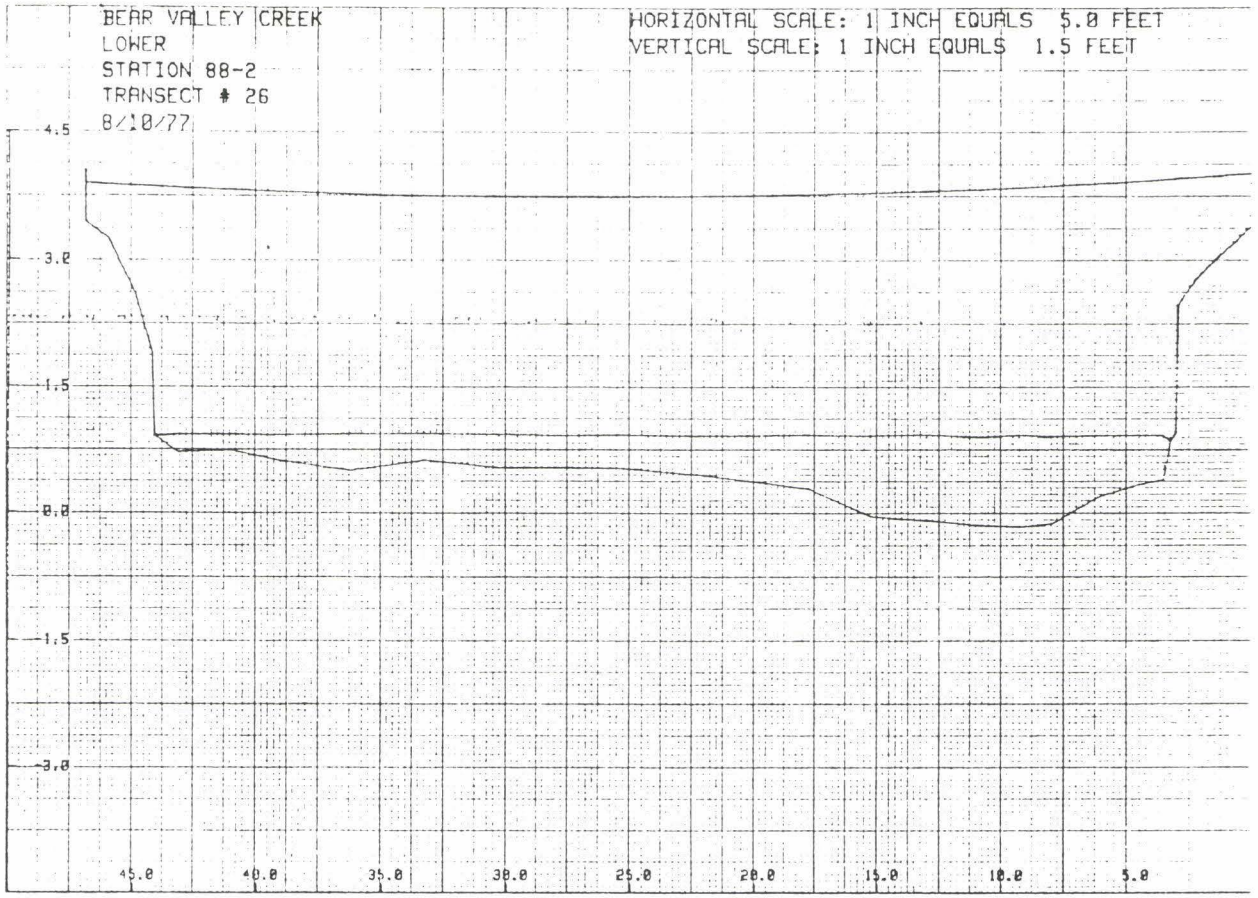
HORIZONTAL SCALE: 1 INCH EQUALS 4.2 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET

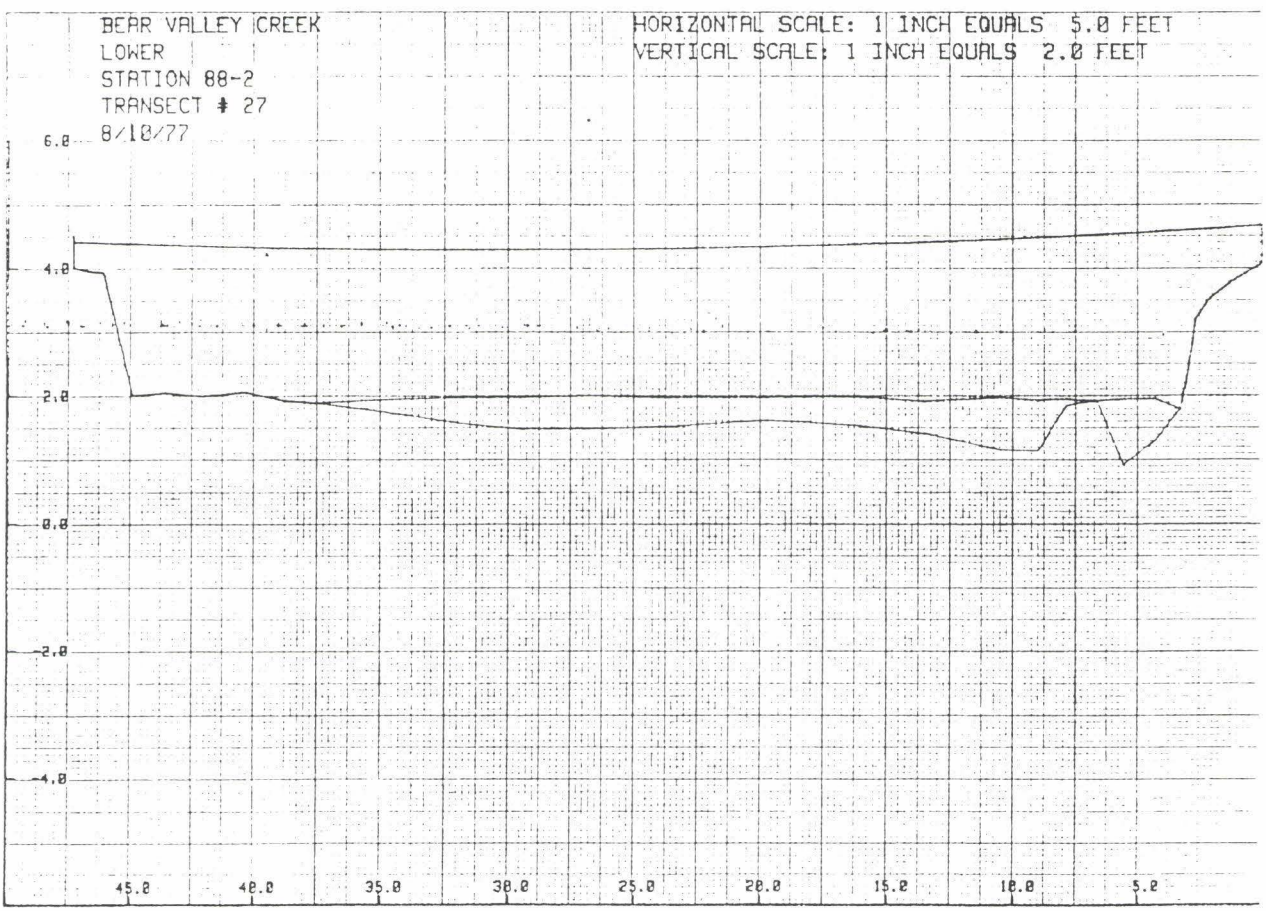


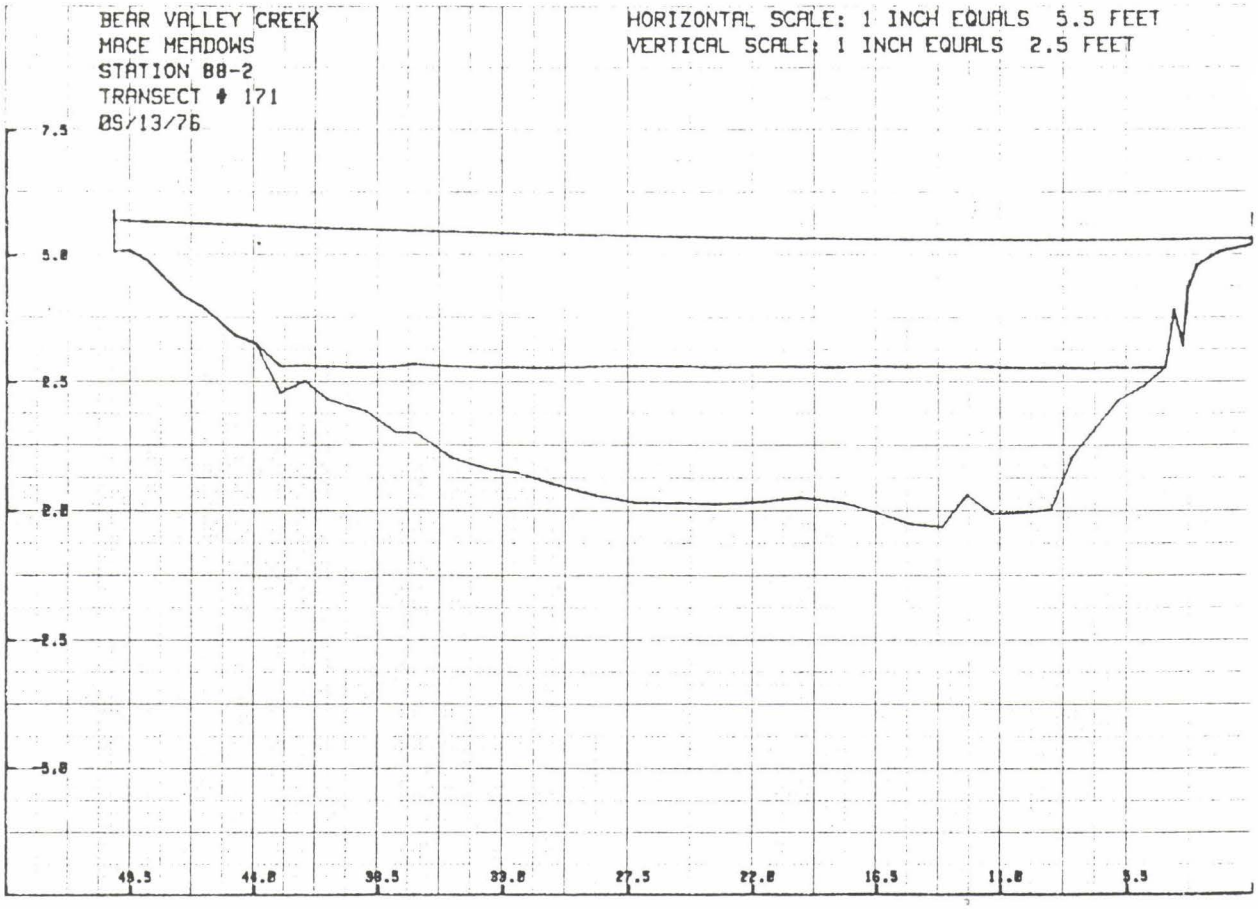
BEAR VALLEY CREEK
MACE MEADOWS
STATION 88-2
TRANSECT # 135
09/13/76

HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET




BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 26
8/10/77
HORIZONTAL SCALE: 1 INCH EQUALS 5.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 1.5 FEET
4.5
3.0
1.5
0.0
-1.5
-3.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0


BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 27
8/10/77
HORIZONTAL SCALE: 1 INCH EQUALS 5.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0


BEAR VALLEY CREEK
MACE MEADOWS
STATION BB-2
TRANSECT # 171
08/13/76
HORIZONTAL SCALE: 1 INCH EQUALS 5.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
49.5
44.0
38.5
33.0
27.5
22.0
16.5
11.0
5.5

APPENDIX 1

Annual Geomorphic/aquatic analysis means, standard deviations, and 95 percent confidence intervals for Lower Bear Valley.

Table A-1.--Summary of geomorphic/aquatic analysis means, standard deviations and 95 percent confidence intervals, Lower Bear Valley Creek, Idaho, 1976.

Variable	Site 1			Site 2			Site 3		
	Mean	S.D.[1]	C.I.[2]	Mean	S.D.	C.I.	Mean	S.D.	C.I.
Water Column									
Stream width (feet)	36.5	7.17	34.66-38.36	32.5	7.11	30.59-34.31	32.0	7.39	30.12-33.85
Stream depth (feet)	0.8	0.23	0.75-0.89	0.8	0.27	0.72-0.86	0.8	0.31	0.78-0.92
Riffle width (percent)	68.8	32.30	61.73-75.80	76.1	20.0	68.98-83.16	61.9	28.53	54.78-68.96
Pool width (percent)	31.2	32.30	24.19-38.28	23.9	20.0	16.83-31.03	38.3	28.67	31.23-45.44
Pool feature	6.3	1.04	5.86-6.75	6.1	1.48	5.63-6.52	4.8	2.07	4.39-5.23
Pool Rating	3.4	1.04	3.09-3.76	3.2	1.14	2.88-3.55	2.9	1.40	2.58-3.21
Streambanks									
Bank angle (degrees)	103.1	27.83	96.26-109.91	122.9	19.61	116.02-129.78	109.9	31.17	102.97-116.73
Bank undercut (feet)	0.52	0.52	0.42-0.63	0.19	0.26	0.01-0.29	0.47	0.39	0.36-0.57
Bank depth (feet)	0.47	0.29	0.40-0.53	0.35	0.23	0.28-0.41	0.36	0.20	0.29-0.41
Fisheries rating	2.9	0.68	2.79-3.08	2.7	0.50	2.55-2.85	2.8	0.54	2.60-2.90
Streambottom									
Fines <0.03 in. (percent)	21.4[3]	15.59	14.78-27.99	46.5	32.89	39.83-53.15	50.6	26.01	43.97-57.28
Fines >0.03 in. (percent)	N.D.[4]	-	-	N.D.	-	-	N.D.	-	-
Gravel (percent)	42.9	28.6	36.29-49.54	37.8	28.7	31.13-44.49	31.6	19.08	24.94-38.30
Rubble (percent)	33.3[5]	21.24	28.39-31.16	14.0	17.43	9.07-18.92	17.5	18.30	12.53-22.38
Boulder (percent)	2.2[5]			1.7			0.3		
Substrate embeddedness	3.3	0.87	2.96-3.56	2.7	1.55	2.35-2.95	2.2	0.98	1.88-2.49
Instream veg. cover (feet)	N.D.[5]	-	-	N.D.	-	-	N.D.	-	-

[1] S.D. - Standard deviation

[2] C.I. - Confidence interval

[3] Fines were not separated into <0.03 and >0.03 in 1976.

[4] N.D. - No data.

[5] Boulders were separated into large and small from 1976 through 1978; data are combined here.

Table A-2.--Summary of geomorphic/aquatic analysis means, standard deviations and 95 percent confidence intervals, Lower Bear Valley Creek, Idaho, 1977.

Variable	Site 1			Site 2			Site 3		
	Mean	S.D.[1]	C.I.[2]	Mean	S.D.	C.I.	Mean	S.D.	C.I.
Water Column									
Stream width (feet)	24.1	5.27	22.92-25.24	23.9	4.01	22.68-25.02	20.8	4.17	19.67-22.00
Stream depth (feet)	0.6	0.16	0.51-0.62	0.7	0.23	0.64-0.75	0.63	0.24	0.58-0.69
Riffle width (percent)	75.7	16.29	71.14-80.18	71.4	17.71	66.83-75.95	74.7	18.87	70.19-79.31
Pool width (percent)	24.3	16.29	19.82-28.86	28.6	17.71	24.05-33.17	25.3	18.87	20.69-29.81
Pool feature	4.5	1.13	4.13-4.87	5.5	1.39	5.11-5.87	5.5	1.77	5.15-5.92
Pool rating	2.8	1.36	2.52-3.15	3.5	0.99	3.21-3.85	2.9	1.31	2.61-3.25
Streambanks									
Bank angle (degrees)	101.2	32.55	92.99-109.34	107.2	32.00	98.94-115.43	106.4	31.22	98.17-114.66
Bank undercut (feet)	0.20	0.26	0.12-0.28	0.20	0.34	0.12-0.29	0.29	0.35	0.21-0.37
Bank depth (feet)	0.23	0.14	0.19-0.28	0.21	0.16	0.16-0.26	0.27	0.21	0.22-0.32
Fisheries rating	3.3	0.66	3.12-3.57	3.7	0.78	3.49-3.94	3.4	1.11	3.19-3.64
Streambottom									
Fines <0.03 in. (percent)	14.7	13.35	9.51-19.95	30.6	23.66	25.37-35.90	30.1	22.62	24.80-35.32
Fines >0.03 in. (percent)	17.1	20.75	13.04-21.14	19.9	13.96	15.79-23.95	12.3	10.98	8.18-16.34
Gravel (percent)	35.2	25.94	27.83-42.63	32.8	28.37	25.27-40.19	49.5	32.08	42.05-56.97
Rubble (percent)	26.8	21.94	22.71-30.88	15.3	14.52	11.16-19.39	6.8	8.16	2.64-10.87
Boulder (percent)[3]	4.9			1.4			1.0		
Substrate embeddedness	3.1	1.14	2.87-3.43	2.4	1.05	2.15-2.72	2.8	1.11	2.47-3.03
Instream veg. cover (feet)	N.D.[4]	-	-	N.D.	-	-	N.D.	-	-

[1] S.D. - Standard deviation
[2] C.I. - Confidence interval
[3] Boulders were separated into large and small from 1976 through 1978; data combined here.
[4] N.D. - no data.

Table A-3.—Summary of geomorphic/aquatic analysis means, standard deviations, and 95 percent confidence intervls, Lower Bear Valley Creek, Idaho, 1978.

Variable	Site 1			Site 2			Site 3		
	Mean	S.D.[1]	C.I.[2]	Mean	S.D.	C.I.	Mean	S.D.	C.I.
Water Column									
Stream width (feet)	37.4	7.11	35.60-39.22	34.5	6.48	32.63-36.27	33.0	7.53	31.16-34.80
Stream depth (feet)	0.8	0.22	0.73-0.88	0.9	0.25	0.79-0.94	0.9	0.35	0.84-0.98
Riffle width (percent)	66.2	29.62	59.43-72.88	74.8	20.29	68.01-81.57	72.3	27.88	65.53-79.09
Pool width (percent)	33.8	29.62	27.12-40.57	25.2	20.29	18.43-31.99	27.7	27.88	20.91-34.47
Pool feature	1.0	0	1.0-1.0	1.0	0	1.0-1.0	1.0	0	1.0-1.0
Pool Rating	2.2	1.48	1.78-2.63	2.4	1.66	1.95-2.84	3.2	1.70	2.71-3.61
Streambanks									
Bank angle (degrees)	83.6	32.26	75.64-91.61	102.5	27.99	94.40-110.50	76.7	33.01	68.62-84.72
Bank undercut (feet)	0.3	0.23	0.23-0.35	0.2	0.17	0.12-0.23	0.4	0.27	0.32-0.44
Bank depth (feet)	0.3	0.25	0.21-0.34	0.2	0.25	0.15-0.28	0.4	0.26	0.29-0.42
Fisheries rating	3.3	1.22	3.01-3.52	2.9	1.00	2.64-3.16	3.2	0.66	2.94-3.46
Streambottom									
Fines <0.03 in. (percent)	1.6	3.46	-0.19-3.41	6.0	10.21	4.22-7.85	3.5	5.74	1.67-5.30
Fines >0.03 in. (percent)	23.5	22.71	17.92-29.09	24.3	31.84	18.70-29.96	28.1	20.83	22.44-33.71
Gravel (percent)	58.8	24.59	52.57-65.04	56.8	24.82	50.50-63.07	54.1	23.60	47.81-60.38
Rubble (percent)	13.8	12.09	9.76-17.84	12.0	16.65	7.97-16.12	14.4	18.05	10.34-18.49
Boulder (percent)[3]	0.9			0.8			0.5		
Substrate embeddedness	2.6	0.67	2.39-2.82	3.0	1.10	2.80-3.23	2.6	0.70	2.35-2.78
Instream veg. cover (feet)	2.8	0.26	1.91-3.63	2.5	0.32	1.60-3.34	2.6	0.41	1.68-3.42

[1] S.D. - Standard deviation

[2] C.I. - Confidence interval

[3] Fines were not separated into <0.03 and >0.03 in 1976.

[4] Boulders were separated into large and small from 1976 through 1978; data combined here.

[5] N.D. - No. data.

Table A-4.--Summary of geomorphic/aquatic analysis means, standard deviations and 95 percent confidence intervals, Lower Bear Valley Creek, Idaho, 1979.

Variable	Site 1			Site 2			Site 3		
	Mean	S.D.[1/]	C.I.[2/]	Mean	S.D.	C.I.	Mean	S.D.	C.I.
Water Column									
Stream width (feet)	35.0	7.72	33.2-36.8	31.8	5.86	30.1-33.6	30.8	7.09	29.0-32.6
Stream depth (feet)	0.68	0.25	0.61-0.75	0.70	0.24	0.63-0.77	0.81	0.31	0.74-0.88
Riffle width (percent)	38.4	28.81	30.7-46.0	55.9	30.87	48.2-63.6	53.8	29.85	46.1-61.5
Pool width (percent)	61.6	28.81	54.0-69.3	44.1	30.87	36.4-51.8	46.2	29.85	38.5-53.9
Pool feature	1.0	0	1.0-1.0	1.0	0	1.0-1.0	1.0	0	1.0-1.0
Pool Rating	3.8	0.72	3.6-4.0	3.4	1.05	3.2-3.7	4.3	0.58	4.1-4.5
Streambanks									
Bank angle (degrees)	84.	36.53	75.-92.	105.	32.27	97.-114.	81.	30.38	73.-90
Bank undercut (feet)	0.34	0.26	0.28-0.40	0.17	0.17	0.11-0.23	0.36	0.27	0.36-0.42
Bank depth (feet)	0.29	0.27	0.23-0.35	0.19	0.21	0.12-0.25	0.25	0.22	0.19-0.3
Fisheries rating	3.0	0.71	2.8-3.2	2.6	0.85	2.4-2.8	3.0	0.71	2.8-3.2
Streambottom									
Fines <0.03 in. (percent)	20.2	23.13	14.5-26.0	25.9	20.74	20.2-31.7	23.6	23.28	17.8-29.4
Fines >0.03 in. (percent)	15.1	12.29	11.0-19.2	18.7	18.27	14.6-22.9	21.2	17.11	17.0-25.3
Gravel (percent)	44.7	20.77	38.3-51.1	41.3	29.15	35.0-47.8	39.8	24.53	33.3-46.3
Rubble (percent)	17.0	13.76	12.7-21.2	13.3	19.20	9.1-17.6	15.2	16.28	10.9-19.4
Boulder (percent)	3.0	5.58	2.1-3.9	0.7	1.77	0.-1.6	0.2	1.06	0.-1.1
Substrate embeddedness	2.3	0.89	2.0-2.5	2.2	1.01	2.0-2.4	2.3	0.83	2.1-2.5
Instream veg. cover (feet)	11.1	0.62	9.4-12.8	7.4	0.74	5.7-9.2	7.0	0.64	5.3-8.8

[1/] S.D. - Standard deviation

[2/] C.I. - Confidence interval

Table A-5.--Summary of geomorphic/aquatic analysis means, standard deviations and 95 percent confidence intervals, Lower Bear Valley Creek, Idaho, 1980.

Variable	Site 1			Site 2			Site 3		
	Mean	S.D.[1/]	C.I.[2/]	Mean	S.D.	C.I.	Mean	S.D.	C.I.
Water Column									
Stream width (feet)	35.8	6.56	34.2-37.4	31.7	5.60	30.1-33.4	32.0	6.83	29.4-32.7
Stream depth (feet)	0.73	0.20	0.67-0.80	0.75	0.25	0.68-0.82	0.79	0.33	0.72-0.86
Riffle width (percent)	9.0	24.62	3.9-14.1	10.5	23.43	5.4-15.6	1.1	4.13	0-6.2
Pool width (percent)	91.0	24.62	85.9-96.1	89.5	23.43	84.4-94.6	98.9	4.13	93.8-104.0
Pool feature	1.0	0	1.0-1.0	1.0	0	1.0-1.0	1.0	0	1.0-1.0
Pool Rating	3.9	0.43	3.8-4.0	4.8	0.53	4.7-4.9	5.0	0	4.9-5.1
Streambanks									
Bank angle (degrees)	93	32.72	85-100	103	28.43	96-111	79	27.20	71-86
Bank undercut (feet)	0.33	0.29	0.26-0.40	0.22	0.21	0.15-0.28	0.40	0.28	0.33-0.47
Bank depth (feet)	0.34	0.27	0.27-0.41	0.26	0.28	0.19-0.33	0.30	0.24	0.23-0.37
Fisheries rating	3.2	0.64	3.1-3.4	3.8	0.75	3.6-3.9	4.3	0.64	4.1-4.5
Streambottom									
Fines <0.03 in. (percent)	19.2	16.34	14.2-24.1	26.4	22.86	21.4-31.4	23.3	18.12	18.3-28.3
Fines >0.03 in. (percent)	15.6	13.81	11.7-19.4	14.9	16.36	11.0-18.7	16.9	14.67	13.0-20.8
Gravel (percent)	41.8	20.74	35.1-48.4	41.7	27.45	35.0-48.4	38.5	28.94	31.8-45.2
Rubble (percent)	18.9	12.80	14.0-23.8	15.9	20.38	11.0-20.9	20.7	22.90	15.7-25.6
Boulder (percent)	4.7	7.69	3.5-5.9	1.1	2.06	0-2.4	0.6	1.62	0-1.8
Substrate embeddedness	2.7	0.65	2.4-2.9	2.5	1.26	2.3-2.8	2.5	0.83	2.2-2.7
Instream veg. cover (feet)	1.6	0.17	1.0-2.1	1.7	0.26	1.2-2.2	1.6	0.18	1.0-2.1

[1/] S.D. - Standard deviation

[2/] C.I. - Confidence interval

Table A-6.--Summary of geomorphic/aquatic analysis means, standard deviations and 95 percent confidence intervals, Lower Bear Valley Creek, Idaho, 1981.

Variable	Site 1			Site 2			Site 3		
	Mean	S.D.[1/]	C.I.[2/]	Mean	S.D.	C.I.	Mean	S.D.	C.I.
Water Column									
Stream width (feet)	35.5	6.35	33.7-37.3	33.1	6.88	31.3-35.0	32.2	7.78	30.4-34.0
Stream depth (feet)	0.82	0.24	0.74-0.90	0.86	0.28	0.79-0.94	0.87	0.36	0.80-0.95
Riffle width (percent)	68.0	22.49	60.7-75.2	61.8	30.52	54.4-69.1	58.6	31.35	51.3-66.0
Pool width (percent)	32.0	22.49	24.8-39.3	38.2	30.52	30.9-45.6	41.4	31.35	34.0-48.7
Pool feature	6.1	1.97	5.6-6.5	7.6	0.49	7.2-8.1	7.1	1.83	6.6-7.5
Pool Rating	2.9	1.21	2.6-3.3	3.7	1.73	3.3-4.1	3.8	1.29	3.4-4.1
Streambanks									
Bank angle (degrees)	90	32.04	82-98	100	30.30	92-108	77	27.98	20-85
Bank undercut (feet)	0.32	0.25	0.27-0.39	0.28	0.22	0.21-0.35	0.48	0.29	0.41-0.55
Bank depth (feet)	0.41	0.29	0.34-0.49	0.40	0.33	0.32-0.48	0.48	0.29	0.40-0.55
Fisheries rating	2.4	0.80	2.2-2.6	2.6	0.81	2.4-2.7	2.3	0.65	2.1-2.4
Streambottom									
Fines <0.03 in. (percent)	28.1	20.04	22.0-34.2	38.9	27.58	32.7-45.0	29.3	23.35	23.1-35.4
Fines >0.03 in. (percent)	8.3	9.89	5.6-10.9	4.8	8.10	2.1-7.5	9.4	12.57	6.7-12.1
Gravel (percent)	45.5	21.29	38.9-52.1	41.2	29.08	34.9-48.2	46.2	26.23	40.0-52.9
Rubble (percent)	15.0	10.31	11.2-18.8	14.0	15.96	9.8-17.5	15.0	17.54	10.9-18.6
Boulder (percent)	3.1	5.69	2.1-4.0	5.1	2.26	0.2-2.1	0.3	1.03	0-1.27
Substrate embeddedness	2.7	0.79	2.5-3.0	2.8	1.41	2.5-3.1	2.5	0.87	2.2-2.7
Instream veg. cover (feet)	1.5	1.31	1.6-1.9	1.8	2.15	1.3-2.3	1.8	2.15	1.3-2.3

[1/] S.D. - Standard deviation

[2/] C.I. - Confidence interval

Table A-7.--Summary of geomorphic/aquatic analysis means, standard deviations and 95 percent confidence intervals, Lower Bear Valley Creek, Idaho, 1982.

Variable	Site 1			Site 2			Site 3		
	Mean	S.D.[1/]	C.I.[2/]	Mean	S.D.	C.I.	Mean	S.D.	C.I.
Water Column									
Stream width (feet)	39.4	7.7	37.3-41.4	37.2	7.7	35.1-39.2	34.8	8.8	32.7-36.9
Stream depth (feet)	1.79	0.23	1.11-1.26	1.20	0.33	1.12-1.28	1.22	0.35	1.14-1.29
Riffle width (percent)	20.5	29.1	13.0-27.9	31.2	34.2	23.7-38.7	15.2	23.4	7.7-22.8
Pool width (percent)	79.7	29.1	72.2-87.2	68.8	34.2	61.3-76.3	84.8	23.4	77.2-92.3
Pool feature	5.2	-	-	5.3	-	-	5.3	-	-
Pool Rating	3.9	0.4	3.8-4.0	3.8	0.3	3.8-4.1	4.0	0.3	3.8-4.1
Streambanks									
Bank angle (degrees)	78	30	71-86	94	31	86-101	75	28	67-82
Bank undercut (feet)	0.41	0.29	0.34-0.48	0.30	0.22	0.23-0.37	0.52	0.30	0.45-0.59
Bank depth (feet)	0.59	0.39	0.49-0.69	0.58	0.43	0.47-0.68	0.75	0.36	0.65-0.85
Fisheries rating	2.8	0.6	2.6-2.9	2.9	0.6	2.7-3.0	3.0	0.6	2.9-3.2
Streambottom									
Fines <0.03 in. (percent)	19.2	16.3	14.2-24.1	26.4	22.9	21.4-31.4	23.3	18.1	18.3-28.3
Fines >0.03 in. (percent)	13.9	12.0	10.1-17.8	17.7	18.3	13.8-21.5	19.1	14.0	15.2-23.0
Gravel (percent)	44.2	20.7	38.2-50.3	46.9	26.0	40.8-53.0	43.1	23.9	37.0-49.2
Rubble (percent)	10.4	9.0	6.7-14.0	10.5	16.1	6.8-14.2	13.9	16.6	10.2-17.5
Boulder (percent)	4.4	5.3	3.4-5.4	1.8	2.5	0.8-2.9	1.9	3.5	0.9-2.9
Substrate embeddedness	2.4	0.7	2.1-2.6	2.6	1.0	2.4-2.8	2.3	0.9	2.1-2.5
Instream veg. cover (feet)	1.3	1.3	0.7-2.0	2.9	4.1	2.2-3.6	1.5	1.5	0.8-2.1

[1/] S.D. - Standard deviation

[2/] C.I. - Confidence interval

Table A-8.--Summary of geomorphic/aquatic analysis means, standard deviations and 95 percent confidence intervals, Lower Bear Valley Creek, Idaho, 1985.

Variable	Site 1			Site 2			Site 3		
	Mean	S.D.[1]	C.I.[2]	Mean	S.D.	C.I.	Mean	S.D.	C.I.
Water Column									
Stream width (feet)	36.3	0.9	34.6-38.0	33.0	0.8	31.5-34.6	32.2	1.0	30.2-34.2
Channel width (feet)	38.2	1.0	36.3-4-.2	37.2	1.1	35.0-39.3	34.0	1.0	32.1-36.0
Stream depth (feet)	0.75	0.03	0.69-0.81	0.83	0.03	0.76-0.89	0.89	0.05	0.80-0.98
Riffle width (percent)	21.6	3.4	14.9-28.3	23.5	4.6	14.4-32.6	14.9	3.4	8.3-21.5
Pool width (percent)	78.4	3.4	71.7-85.1	76.5	4.6	67.4-85.6	85.1	3.4	78.5-91.7
Pool quality	3.6	NA[3]	NA	4.2	NA	NA	4.1	NA	NA
Pool feature	5.1	NA	NA	5.5	NA	NA	5.4	NA	NA
Streambanks									
Bank angle (degrees)	96	4	87-104	106	4	98-115	85	4	77-93
Bank undercut (feet)	0.29	0.03	0.23-0.35	0.23	0.03	0.16-0.29	0.42	0.04	0.34-0.51
Shore depth (feet)	0.35	0.04	0.28-0.43	0.41	0.05	0.30-0.51	0.50	0.05	0.41-0.60
Streambottom									
Total fines (percent)	35.6	NA	NA	41.7	NA	NA	49.1	NA	NA
Fines <0.03 in. (percent)	23.7	2.0	19.8-27.6	26.9	2.7	21.6-32.2	33.5	2.9	27.9-39.1
Fines >0.03 in. (percent)	11.9	1.3	9.3-14.5	14.8	1.6	11.7-18.0	15.6	1.6	12.5-18.6
Gravel (percent)	35.5	2.2	31.2-39.8	42.0	3.5	35.0-48.9	42.0	3.0	36.1-47.9
Rubble (percent)	24.6	1.7	21.2-28.0	14.7	2.4	10.0-19.4	8.1	1.6	5.1-11.2
Boulder (percent)	4.4	0.9	2.7-6.1	1.6	0.4	0.8-2.4	0.8	0.4	.0-1.6
Embeddedness (percent)	86.4	0.9	84.6-88.1	88.5	1.2	86.1-90.9	89.7	0.8	88.2-91.2
Instream cover (feet)	7.4	0.6	6.3-8.6	7.3	0.8	5.7-8.8	6.2	0.8	4.7-7.7

[1] S.D. - Standard deviation

[2] C.I. - Confidence interval

[3] Not applicable

APPENDIX 2

Riparian analysis means, standard deviations, and 95 percent confidence intervals by year for Lower Bear Valley, Idaho.

Table A-9.--Summary of riparian analysis means, standard deviation and 95 percent confidence intervals for Lower Bear Valley Creek, Idaho, 1976.

Variable	Site 1			Site 2			Site 3		
	Mean	S.D.[1]	C.I.[2]	Mean	S.D.	C.I.	Mean	S.D.	C.I.
Habitat type	15.7	2.92	14.53-16.87	14.3	3.11	13.10-15.46	12.0	6.68	10.84-13.20
Bank cover stability	2.4	0.56	2.29-2.56	2.3	0.46	2.16-2.44	2.5	0.57	2.40-2.67
Stream cover	2.1	0.28	2.02-2.15	2.0	0.13	1.95-2.08	2.1	0.33	2.02-2.15
Bank alteration (percent)									
Natural	14.2	7.01	10.69-17.80	17.7	14.55	14.12-21.28	23.9	17.86	20.28-27.45
Artificial	24.7	14.16	21.37-28.04	21.1	9.83	17.72-24.45	20.5	14.57	17.15-23.88
Total	38.9			38.8			44.4		
Vegetative use (percent)	74.6	9.63	72.16-77.02	76.5	6.13	74.05-78.95	69.2	11.87	66.70-71.60
Vegetative overhang (feet)	0.7	0.42	0.58-0.79	0.5	0.33	0.36-0.57	0.6	0.46	0.51-0.72
Light intensity	N.D.[3]	-	-	N.D.	-	-	N.D.	-	-

Table A-10.--Summary of riparian analysis means, standard deviation and 95 percent confidence intervals for Lower Bear Valley Creek, Idaho, 1977.

Variable	Site 1			Site 2			Site 3		
	Mean	S.D.[1]	C.I.[2]	Mean	S.D.	C.I.	Mean	S.D.	C.I.
Habitat type	14.6	3.92	13.46-15.72	13.7	4.58	12.60-14.87	13.2	4.69	12.05-14.32
Bank cover stability	2.7	0.72	2.46-2.89	2.4	0.88	2.16-2.60	2.4	0.92	2.15-2.59
Stream cover	1.8	0.43	1.71-1.93	1.9	0.40	1.74-1.96	1.7	0.48	1.55-1.78
Bank alteration (percent)									
Natural	33.0	14.20	29.69-36.38	31.7	11.94	28.32-35.08	40.3	12.97	36.87-43.63
Artificial	5.6	4.56	3.24-8.00	10.1	13.70	7.68-12.48	4.6	7.19	2.15-6.95
Total	38.6			41.8			44.9		
Vegetative use (percent)	74.0	4.58	68.33-79.63	43.3	35.45	37.57-48.96	11.2	13.78	5.47-16.86
Vegetative overhang (feet)	0.7	0.42	0.58-0.79	0.5	0.33	0.36-0.57	0.6	0.46	0.51-0.72
Light intensity	N.D.[3]	-	-	N.D.	-	-	N.D.	-	-

[1] S.D. - Standard deviation
[2] C.I. - Confidence interval
[3] N.D. - No data

Table A-11.--Summary of riparian analysis means, standard deviation and 95 percent confidence intervals for Lower Bear Valley Creek, Idaho, 1978.

Variable	Site 1			Site 2			Site 3		
	Mean	S.D.[1]	C.I.[2]	Mean	S.D.	C.I.	Mean	S.D.	C.I.
Habitat type	16.1	2.67	15.39-16.87	14.6	3.34	13.84-15.33	16.7	2.60	15.92-17.41
Bank cover stability	3.5	0.67	3.35-3.70	3.2	0.76	3.04-3.39	3.5	0.57	3.34-3.69
Stream cover	2.0	0.36	1.89-2.04	2.0	0.22	1.87-2.03	2.1	0.30	2.02-2.18
Bank alteration (percent)									
Natural	10.9	9.66	8.28-13.46	17.7	12.54	15.07-20.29	12.9	7.50	10.31-15.53
Artificial	53.8	18.02	48.82-58.72	33.9	18.96	28.93-38.91	37.2	20.90	32.18-42.16
Total									
Vegetative use (percent)	70.3	12.56	67.48-73.05	9.9	9.51	7.09-12.71	69.6	10.29	66.81-72.43
Vegetative overhang (feet)	0.2	0.16	0.15-0.24	0.2	0.20	0.20-0.29	0.2	0.16	0.14-0.23
Light intensity	N.D.[3]	-	-	N.D.	-	-	N.D.	-	-

Table A-12.--Summary of riparian analysis means, standard deviation and 95 percent confidence intervals for Lower Bear Valley Creek, Idaho, 1979.

Variable	Site 1			Site 2			Site 3		
	Mean	S.D.[1]	C.I.[2]	Mean	S.D.	C.I.	Mean	S.D.	C.I.
Habitat type	13.9	4.74	12.9-14.9	15.0	3.52	13.9-16.0	15.7	3.30	14.7-16.7
Bank cover stability	2.9	0.60	2.8-3.1	2.8	0.74	2.7-3.0	3.1	0.65	3.0-3.3
Stream cover	1.9	0.40	1.7-2.0	1.8	0.42	1.7-1.9	1.9	0.48	1.7-2.0
Bank alteration (percent)									
Natural	16	8.23	14-19	19	10.42	17-21	13	6.81	11-16
Artificial	13	8.09	11-15	12	8.40	10-13	10	5.71	8-12
Total	29			31			23		
Vegetative use (percent)	17	11.34	15-19	0	-	-	48	6.67	46-50
Vegetative overhang (feet)	0.33	0.25	0.28-0.39	0.30	0.21	0.24-0.36	0.25	0.19	0.19-0.31
Canopy cover (degrees)	N.D.[3]	-	-	N.D.	-	-	N.D.	-	-
Light intensity	N.D.	-	-	N.D.	-	-	N.D.	-	-

[1] S.D. - Standard deviation
[2] C.I. - Confidence interval
[3] N.D. - No data

Table A-13.--Summary of riparian analysis means, standard deviation and 95 percent confidence intervals for Lower Bear Valley Creek, Idaho, 1980.

Variable	Site 1			Site 2			Site 3		
	Mean	S.D.[1]	C.I.[2]	Mean	S.D.	C.I.	Mean	S.D.	C.I.
Habitat type	14.8	4.24	13.7-15.8	14.6	3.81	13.6-15.7	15.8	4.02	14.7-16.8
Bank cover stability	2.7	0.67	2.5-2.9	2.7	0.66	2.5-2.8	2.9	0.62	2.7-3.0
Stream cover	1.9	0.48	1.7-2.0	1.9	0.30	1.8-2.0	2.0	0.49	1.9-2.1
Bank alteration (percent)									
Natural	9	4.51	7-10	7	4.35	5-8	7	4.25	5-8
Artificial	37	10.62	34-39	30	12.71	27-33	25	9.86	22-27
Total	46			37			32		
Vegetative use (percent)	77	9.33	74-79	24	12.44	22-27	82	3.47	80-84
Vegetative overhang (feet)	0.33	0.25	0.26-0.39	0.44	0.29	0.37-0.50	0.30	0.20	0.24-0.36
Canopy cover (degrees)	N.D.[3]	-	-	N.D.	-	-	N.D.	-	-
Light intensity	N.D.	-	-	N.D.	-	-	N.D.	-	-

Table A-14.--Summary of riparian analysis means, standard deviation and 95 percent confidence intervals for Lower Bear Valley Creek, Idaho, 1981.

Variable	Site 1			Site 2			Site 3		
	Mean	S.D.[1]	C.I.[2]	Mean	S.D.	C.I.	Mean	S.D.	C.I.
Habitat type	14.0	4.01	12.9-15.1	13.5	4.37	12.4-14.5	14.9	4.06	13.8-16.0
Bank cover stability	3.4	0.76	3.3-3.6	3.2	0.72	3.0-3.4	3.5	0.62	3.4-3.7
Stream cover	1.9	0.34	1.8-2.0	1.8	0.42	1.7-1.9	1.9	0.31	1.8-2.0
Bank alteration (percent)									
Natural	12	7.99	10-14	12	9.92	10-14	11	3.99	9-13
Artificial	29	18.77	25-34	23	19.68	19-28	22	13.46	18-27
Total	41			35			33		
Vegetative use (percent)	63	13.89	60-65	4	6.2	1-7	57	11.03	55-60
Vegetative overhang (feet)	0.16	0.26	0.10-0.22	0.27	0.24	0.21-0.32	0.18	0.19	0.12-0.24
Canopy cover (degrees)	166	3.81	166-167	170	0	169-171	170	0	169-171
Light intensity	N.D.[3]	-	-	N.D.	-	-	N.D.	-	-

[1] S.D. - Standard deviation
[2] C.I. - Confidence interval
[3] N.D. - No data

Table A-15.--Summary of riparian analysis means, standard deviation and 95 percent confidence intervals for Lower Bear Valley Creek, Idaho, 1982.

Variable	Site 1			Site 2			Site 3		
	Mean	S.D.[1]	C.I.[2]	Mean	S.D.	C.I.	Mean	S.D.	C.I.
Habitat type	15.2	4.2	14.3-16.1	15.3	3.6	14.4-16.3	16.5	2.9	15.5-17.4
Bank cover stability	3.1	0.8	2.9-3.3	3.3	0.7	3.1-3.5	3.3	0.9	3.1-3.5
Stream cover	1.9	0.4	1.8-2.0	2.0	0.4	1.8-2.1	2.1	0.6	2.0-2.2
Bank alteration (percent)									
Natural	8	3	7-10	19	8	18-21	12	4	10-13
Artificial	21	10	19-23	7	4	5-9	13	7	11-15
Total	29	-	-	26	-	-	25	-	-
Vegetative use (percent)	0	1	0-0	0	0	0-0	1	2	1-1
Vegetative overhang (feet)	0.35	0.31	0.29-0.42	0.38	0.28	0.31-0.44	0.30	0.19	0.23-0.37
Canopy cover (degrees)	172	2	171-172	175	0	175-175	175	0	175-175

Table A-16.--Summary of riparian analysis means, standard deviation and 95 percent confidence intervals for Lower Bear Valley Creek, Idaho, 1985.

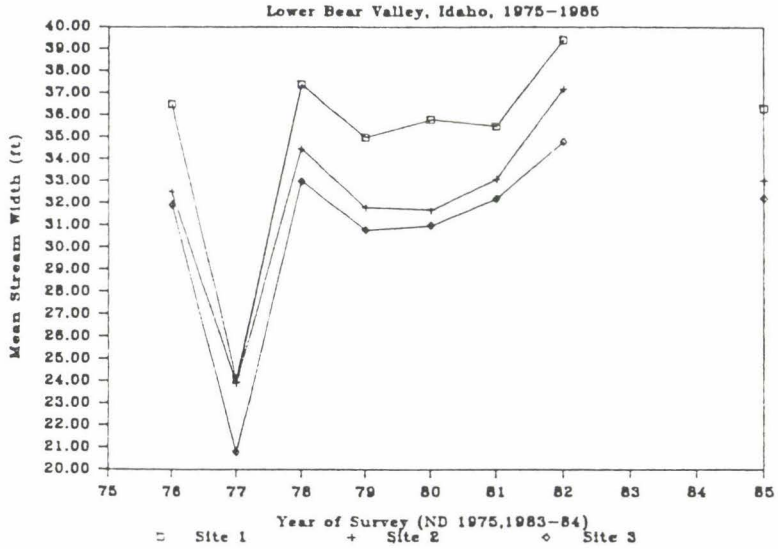
Variable	Site 1			Site 2			Site 3		
	Mean	S.D.[1]	C.I.[2]	Mean	S.D.	C.I.	Mean	S.D.	C.I.
Habitat type	14.5	0.4	13.7-15.3	13.7	0.6	12.6-14.8	14.5	0.5	13.5-15.5
Bank cover stability	79	2	74-83	72	3	66-77	75	3	70-81
Stream cover	1.9	.0	1.9-2.0	1.9	.0	1.8-2.0	2.0	.0	1.9-2.1
Bank alteration (percent)									
Natural	23	2	19-26	35	3	29-40	28	2	24-33
Artificial	15	1	13-17	10	1	8-12	12	1	10-15
Total	37	NA[4]	NA	44	NA	NA	41	NA	NA
Vegetative use (percent)	1	0	0-1	0	0	0-0	3	1	1-4
Vegetative overhang (feet)	0.38	0.05	0.29-0.48	0.39	0.05	0.29-0.48	0.25	0.19	0.19-0.31

[1] S.D. - Standard deviation
[2] C.I. - Confidence interval
[3] N.D. - No data
[4] NA - Not applicable

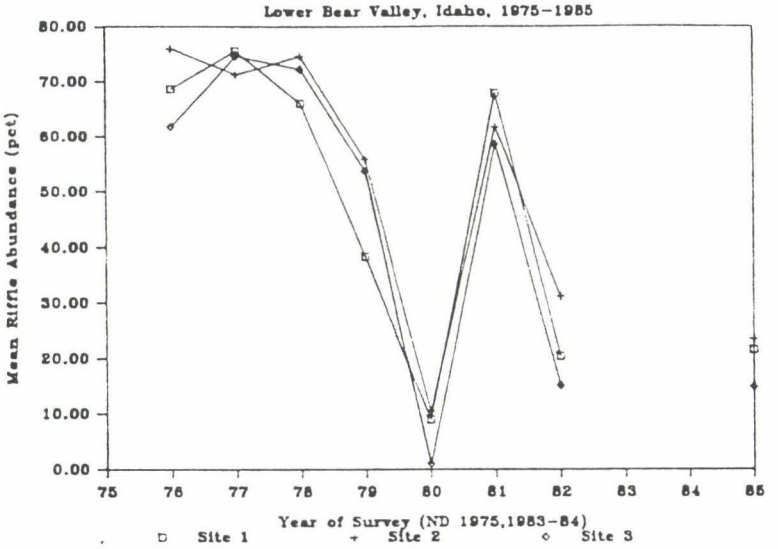
APPENDIX 3

Graphic presentation of fluctuations of geomorphic/aquatic and riparian analysis means over time.

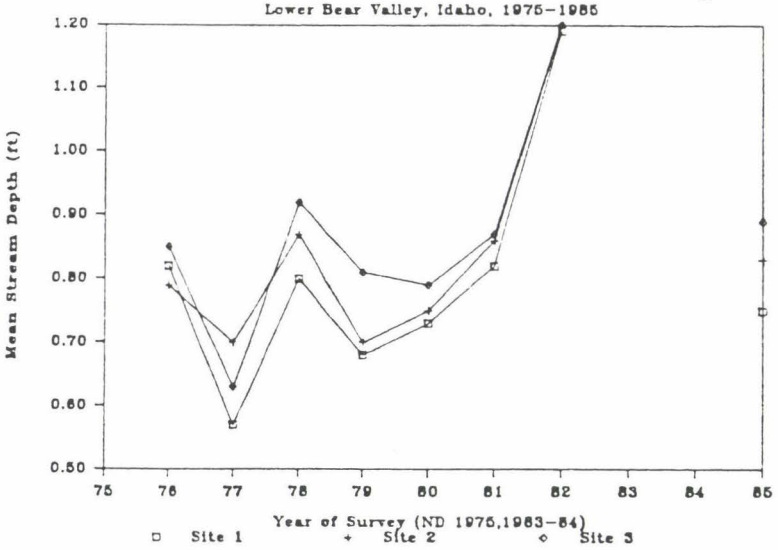
Annual Fluctuations in Mean Width



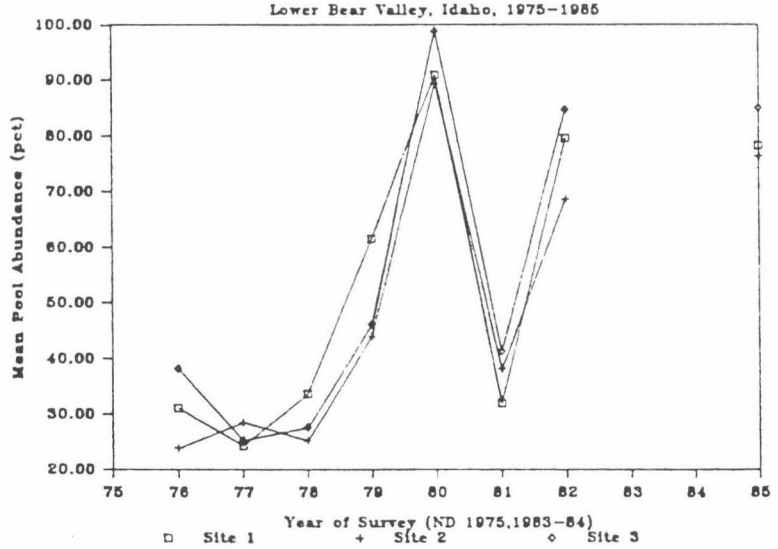
Annual Fluctuations in Riffle Width



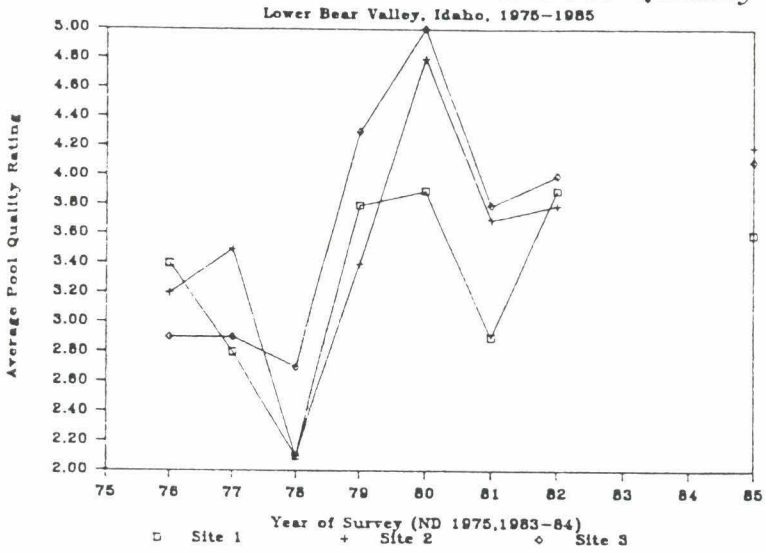
Annual Fluctuations in Mean Depth



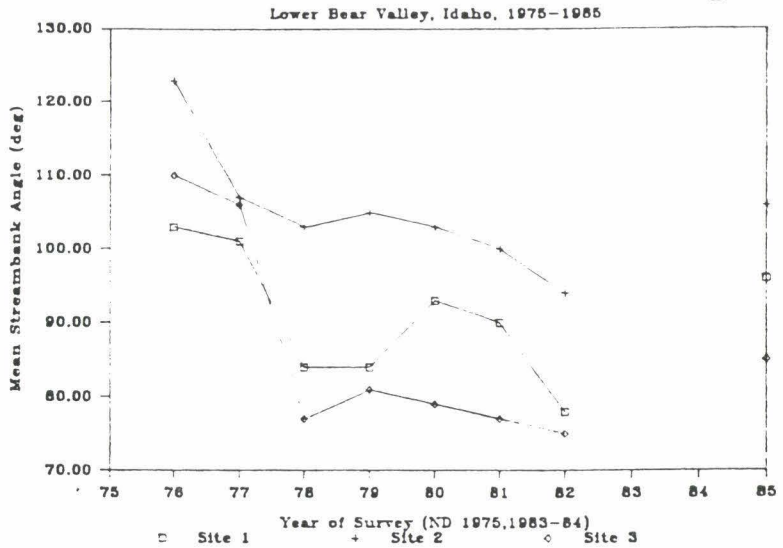
Annual Fluctuations in Pool Width



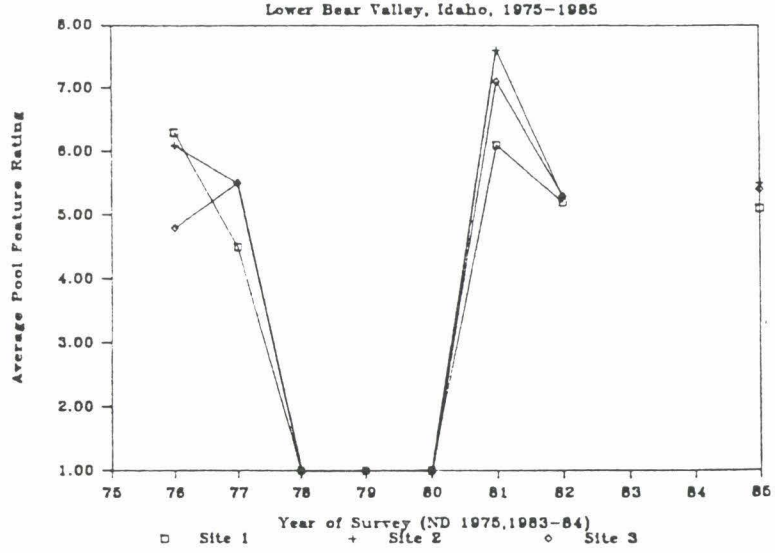
Annual Fluctuations in Pool Quality



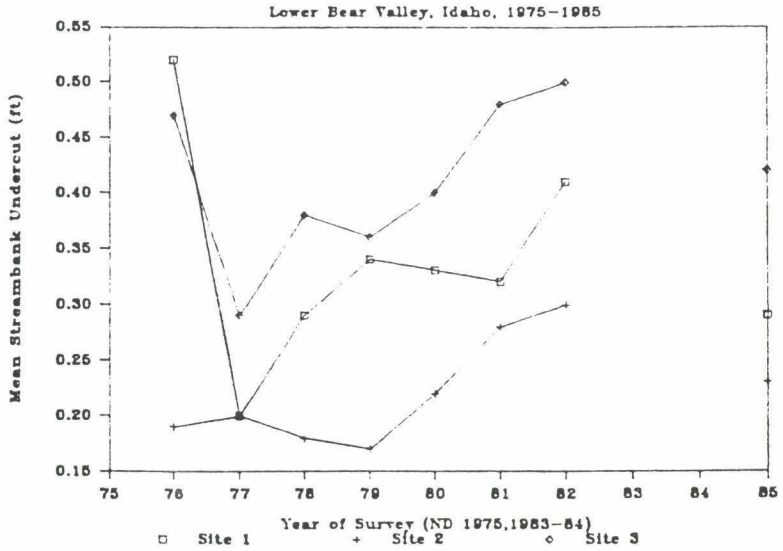
Annual Fluctuations in Bank Angle



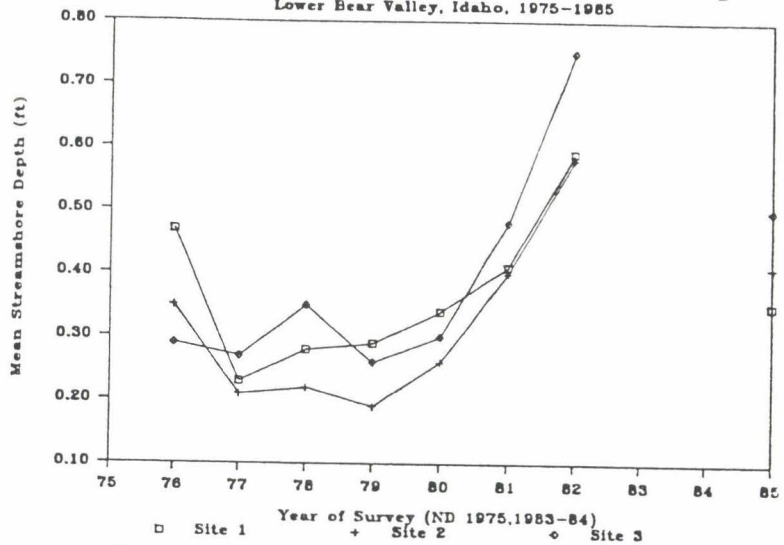
Annual Fluctuations in Pool Feature



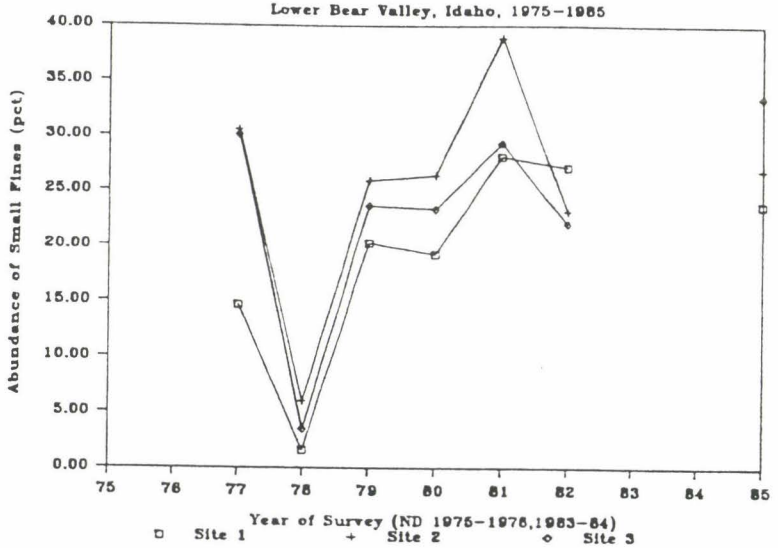
Annual Fluctuations in Undercut



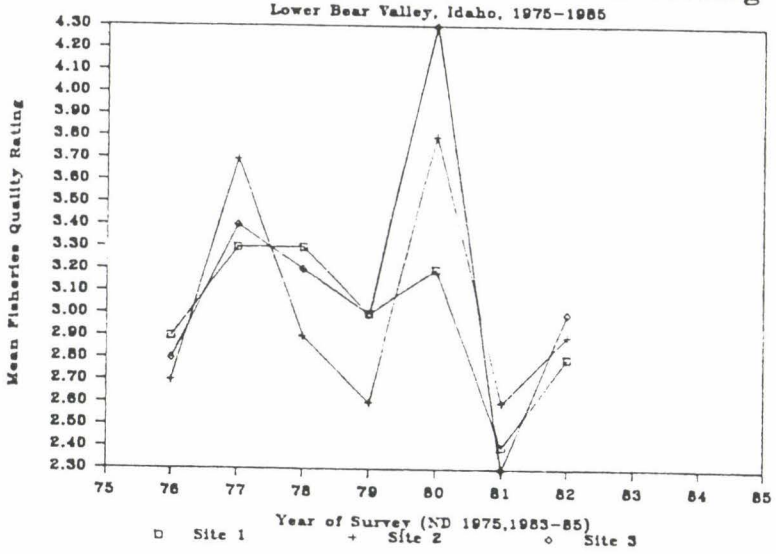
Annual Fluctuations in Shore Depth



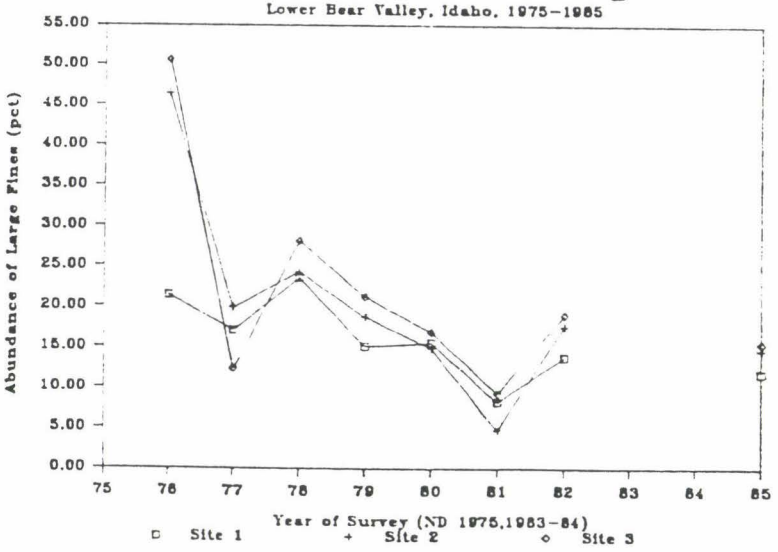
Annual Fluctuations in Small Fines



Annual Fluctuations in Fish Rating

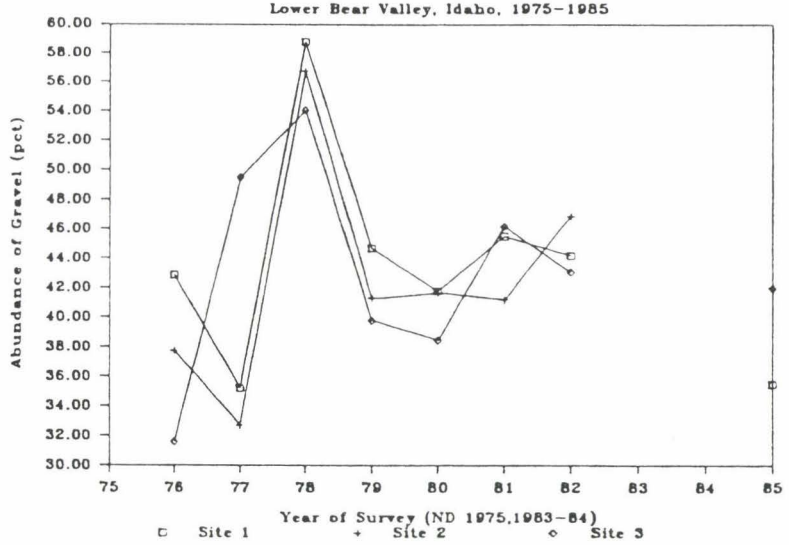


Annual Fluctuations in Large Fines



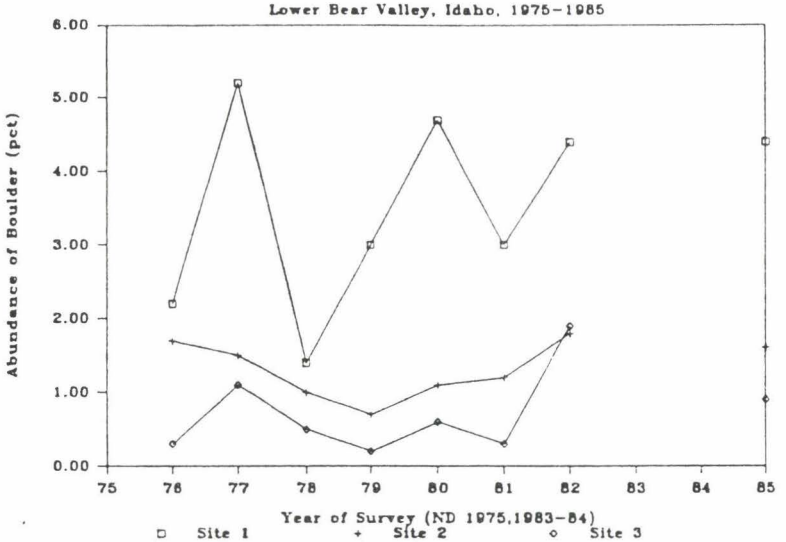
Annual Fluctuations in Gravel

Lower Bear Valley, Idaho, 1975-1985



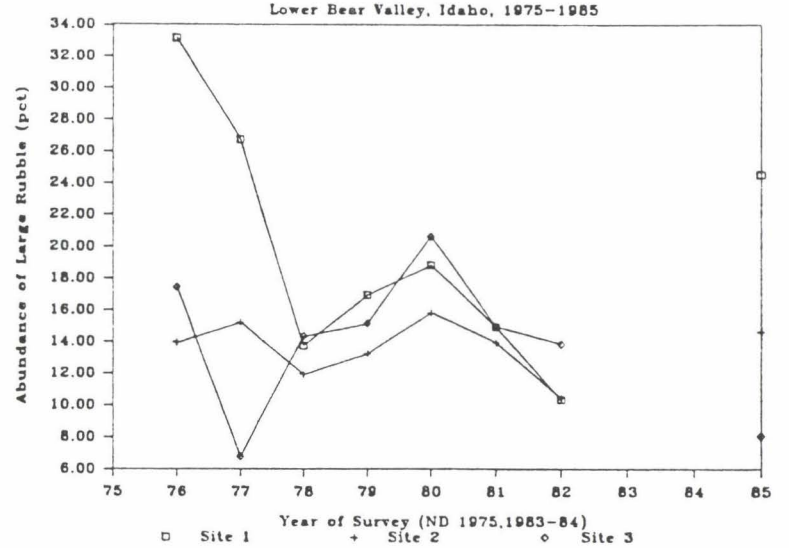
Annual Fluctuations in Boulder

Lower Bear Valley, Idaho, 1975-1985



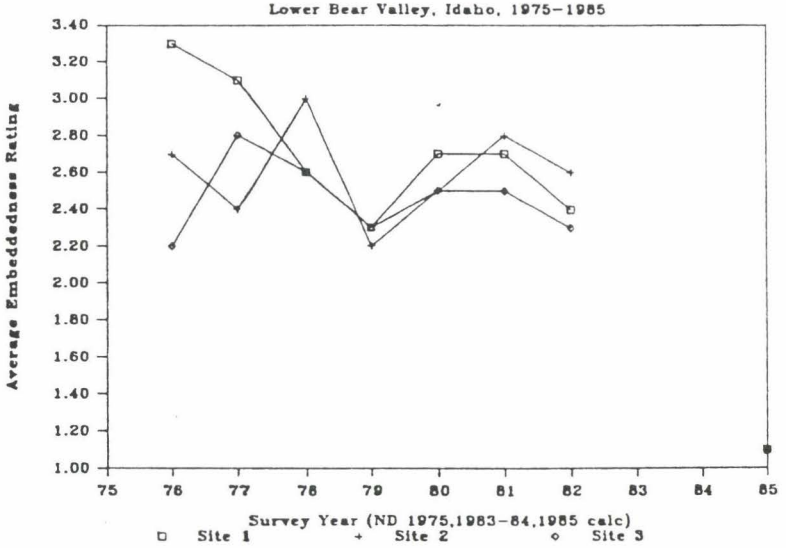
Annual Fluctuations in Rubble

Lower Bear Valley, Idaho, 1975-1985

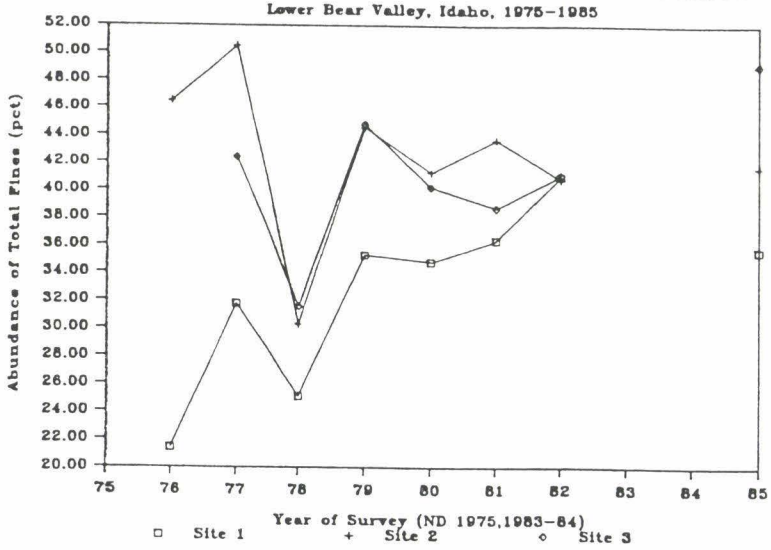


Annual Fluctuations in Embeddedness

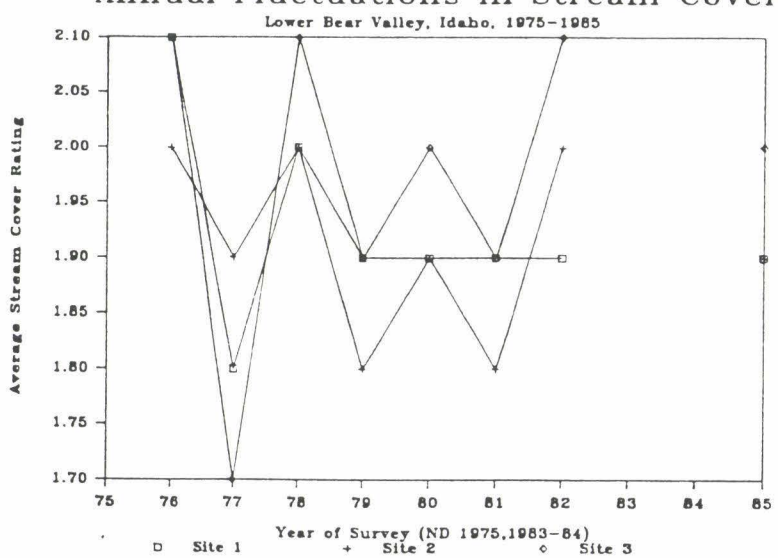
Lower Bear Valley, Idaho, 1975-1985



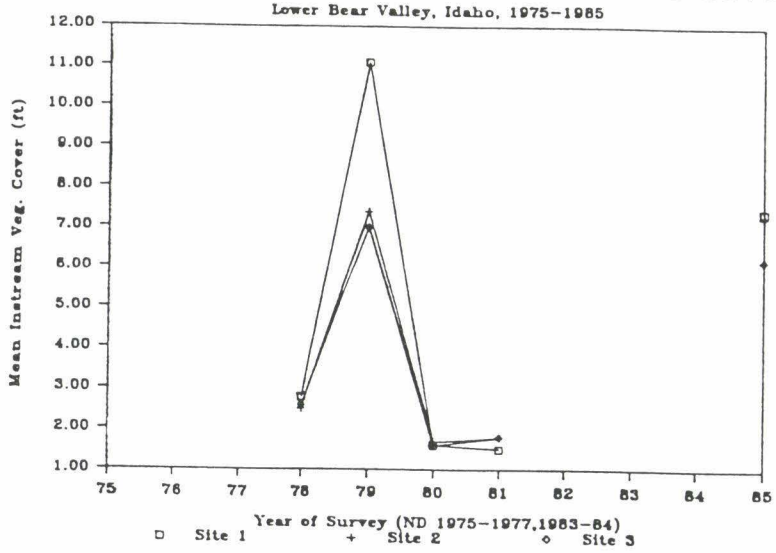
Annual Fluctuations in Total Fines



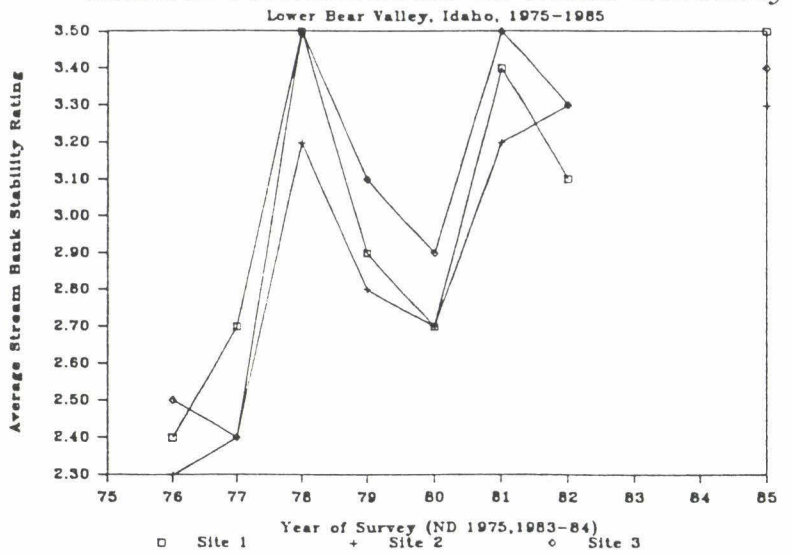
Annual Fluctuations in Stream Cover

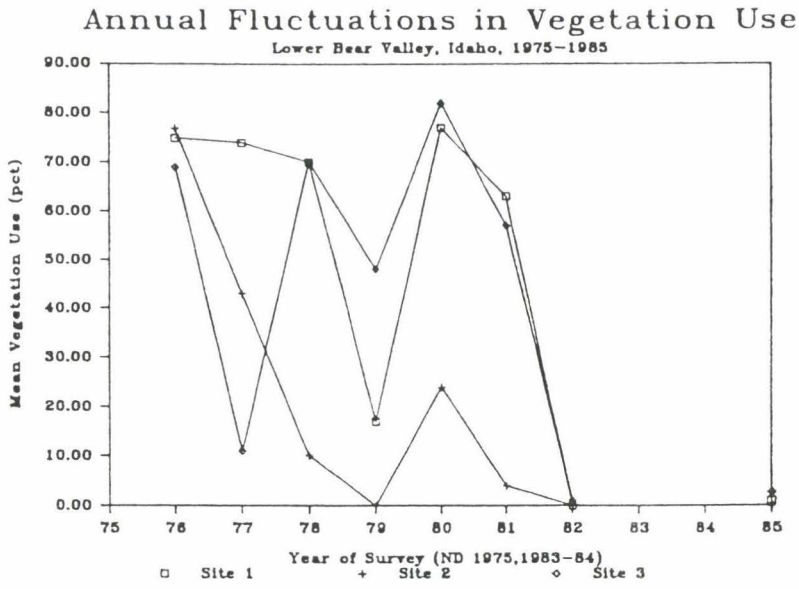


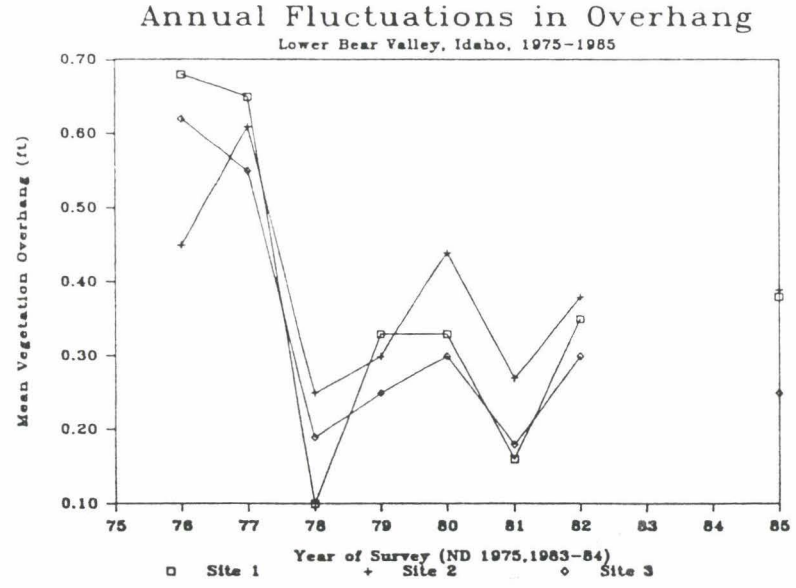
Annual Fluctuations in Instream Cover



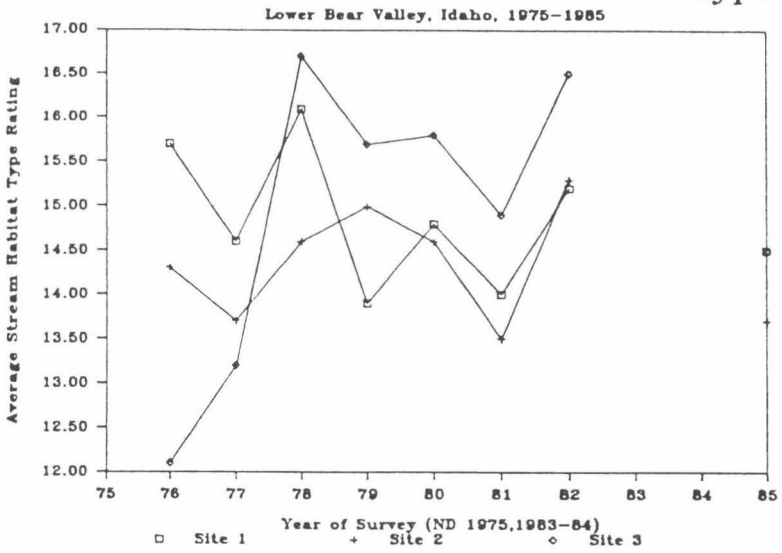
Annual Fluctuations in Bank Stability



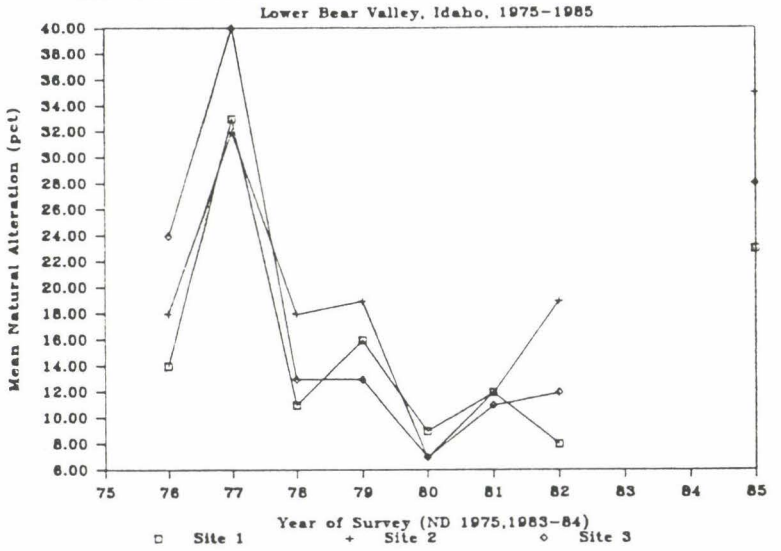

Annual Fluctuations in Vegetation Use
Lower Bear Valley, Idaho, 1975-1985
Mean Vegetation Use (pct)
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
75
76
77
78
79
80
81
82
83
84
85
Year of Survey (ND 1975,1983-84)
Site 1
Site 2
Site 3


Annual Fluctuations in Overhang
Lower Bear Valley, Idaho, 1975-1985
Mean Vegetation Overhang (ft)
0.70
0.60
0.50
0.40
0.30
0.20
0.10
75
76
77
78
79
80
81
82
83
84
85
Year of Survey (ND 1975,1983-84)
Site 1
Site 2
Site 3

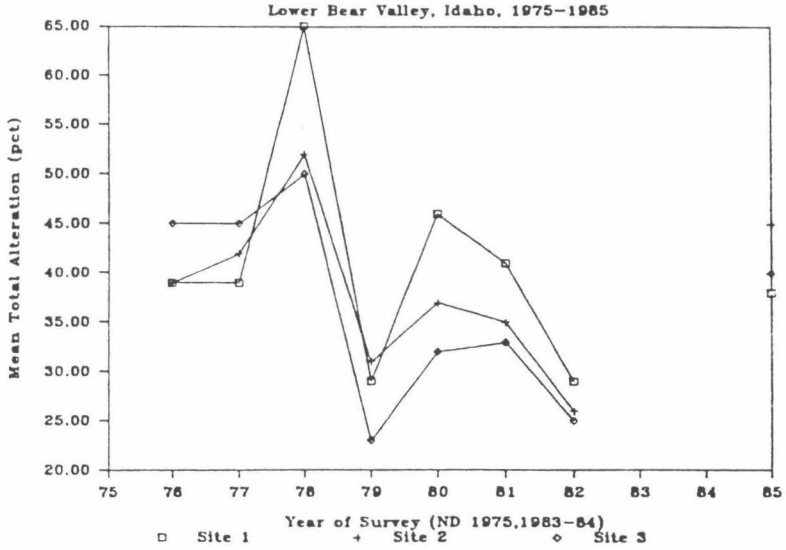
Annual Fluctuations in Habitat Type



Annual Fluctuations in Nat. Alteration



Annual Fluctuations in Total Alteration



Annual Fluctuations in Art. Alteration

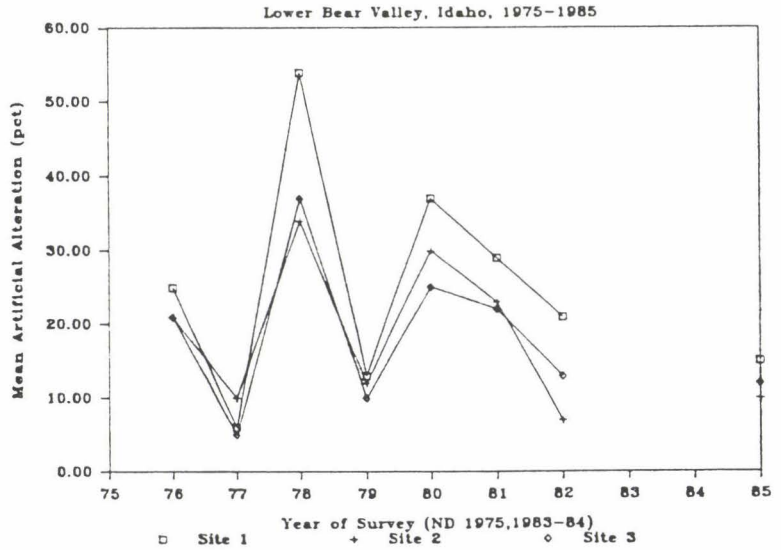


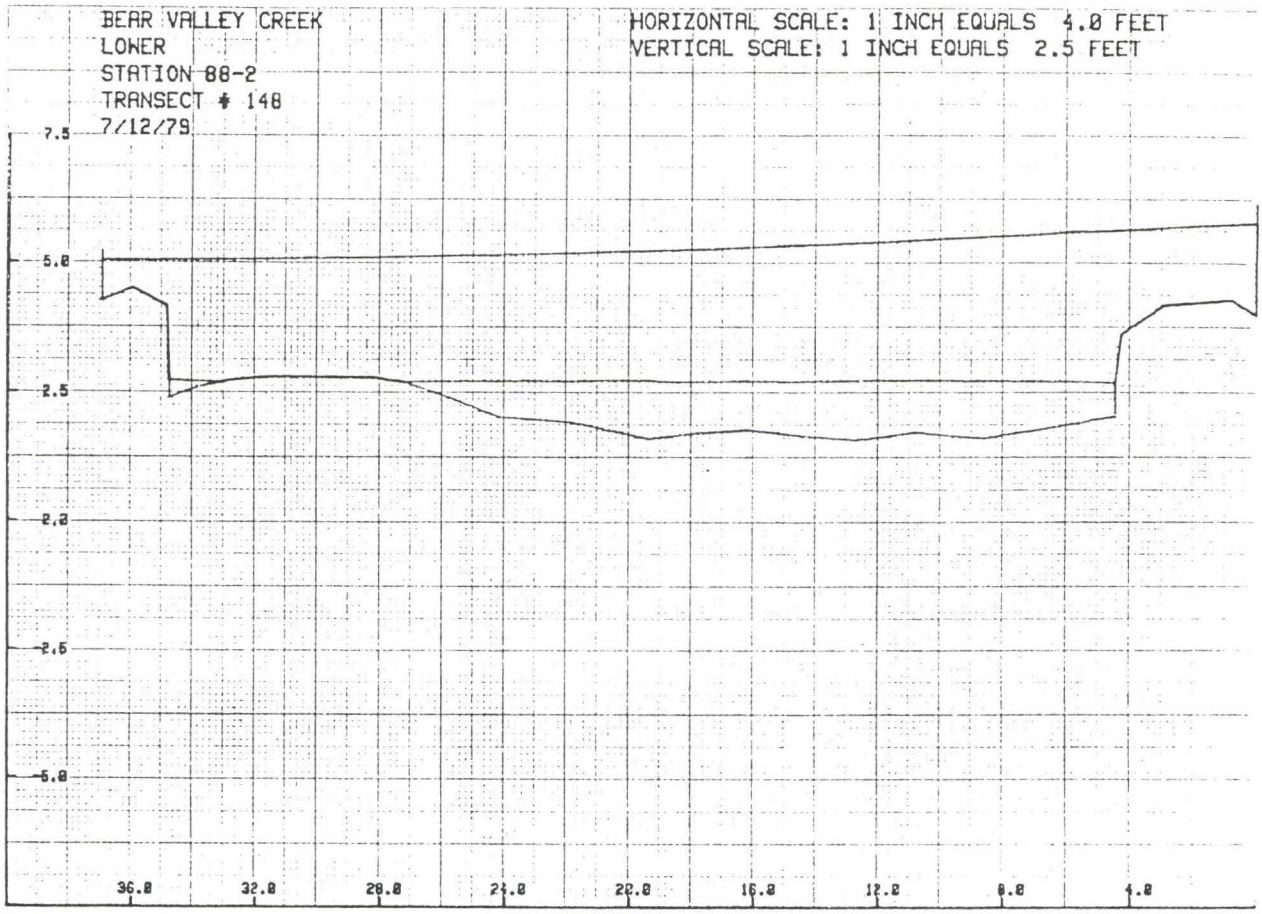
Table A-17.--Fish population analysis results Lower Bear Valley, 1976.

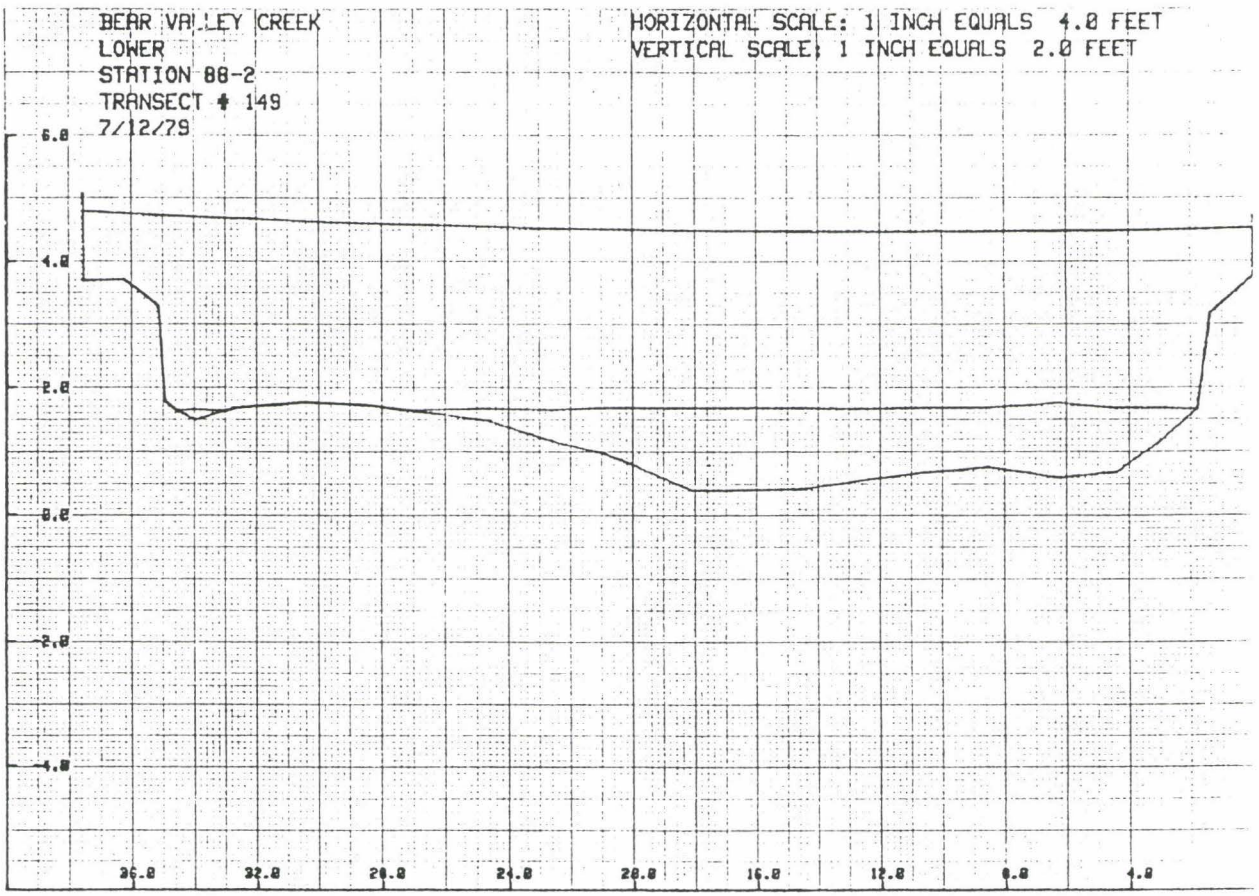
SPECIES/STUDY SITE	Total catch	Population est. Number	95% C.I.[1/]	Mean length Inches (95% C.I.)	mm(95% C.I.)	Mean weight Ounces (95% C.I.)	gm (95% C.I.)
Chinook Salmon							
Site 1	38	48	38-68	NA[2/]	NA	NA	NA
Site 2	14	20	14-43	2.39(2.23-2.55)	60.79(56.68-64.89)	0.09(0.07-0.11)	2.61(2.03-3.18)
Site 3	69	431	-	2.67(2.58-2.77)	67.94(65.62-70.26)	0.14(0.13-0.15)	3.97(3.62-4.32)
Overall	121	280	121-549	NA	NA	NA	NA
Rainbow Trout							
Site 1	46	48	46-53	NA	NA	NA	NA
Site 2	7	8	7-16	2.91(2.20-3.62)	74.0(55.97-92.03)	0.16(0.07-0.25)	4.57(2.00-7.14)
Site 3	24	26	24-33	3.28(2.88-3.68)	83.29(73.15-93.43)	0.28(0.15-0.41)	7.95(4.29-11.61)
Overall	77	86	77-99	NA	NA	NA	NA
Eastern Brook Trout							
Site 1	33	34	33-37	NA	NA	NA	NA
Site 2	6	7	6-16	4.23(2.26-6.19)	107(57.39-157.27)	0.25(<0.01-1.33)	7.33(0.10-37.77)
Site 3	20	20	20-22	NA	NA	NA	NA
Overall	59	63	59-70	NA	NA	NA	NA
Bull Trout							
Site 1	5	8	5-38	3.11(1.12-5.10)	79.0(28.50-129.50)	0.29(0.00-0.74)	8.24(0.00-20.97)
Site 2	8	12	8-37	2.58(1.70-3.47)	65.63(43.11-88.09)	0.16(0.00-0.38)	4.65(0.00-10.85)
Site 3	5	5	5-8	2.29(2.03-2.55)	58.20(51.55-64.85)	0.09(0.08-0.11)	2.60(2.16-3.04)
Overall	18	49	18-223	2.65(2.11-3.19)	67.28(53.57-80.98)	0.18(0.05-0.31)	5.08(1.48-8.67)

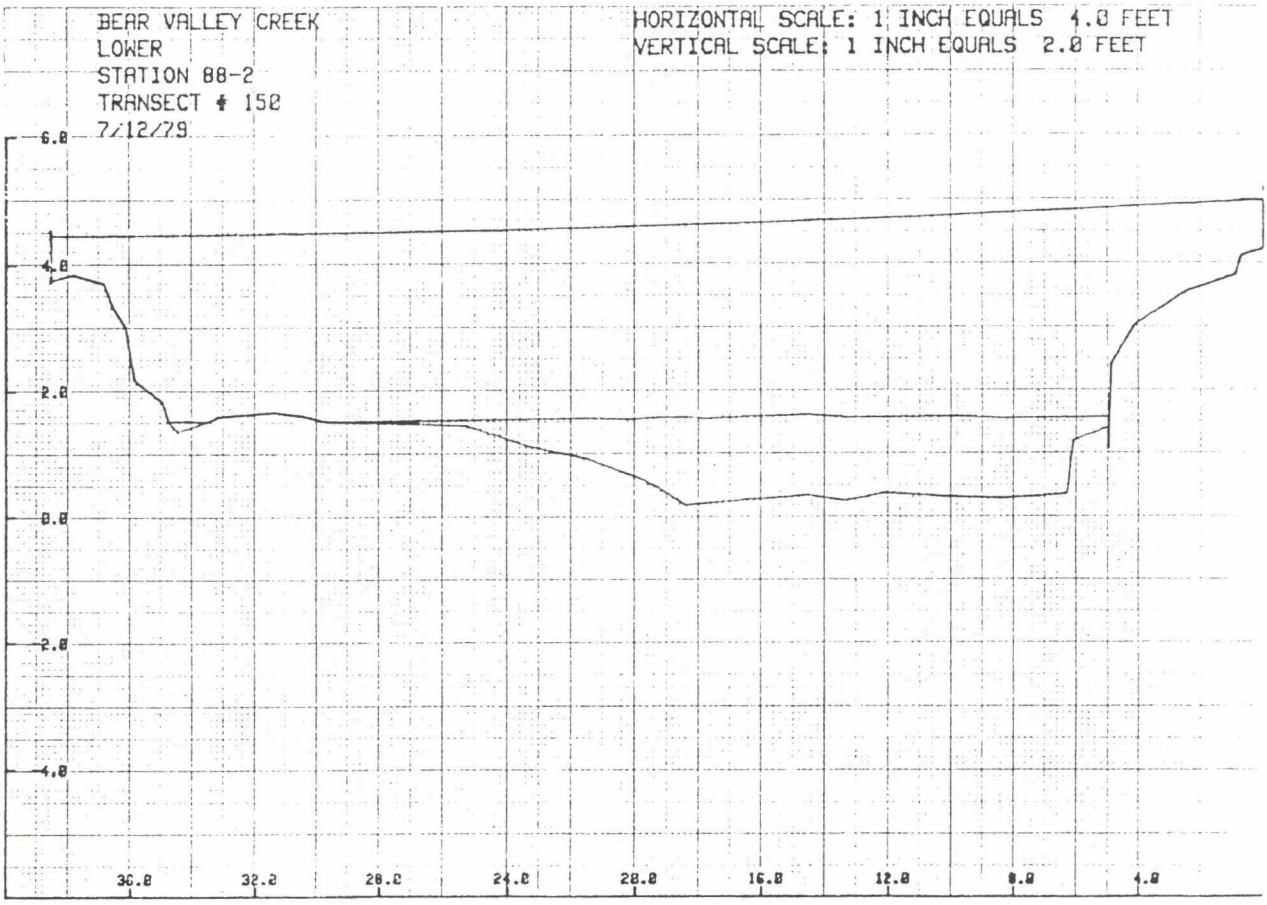
[1/] C.I. - Confidence interval.
[2/] NA - Not available at this time due to data entry or similar error; will be corrected in updated reports.

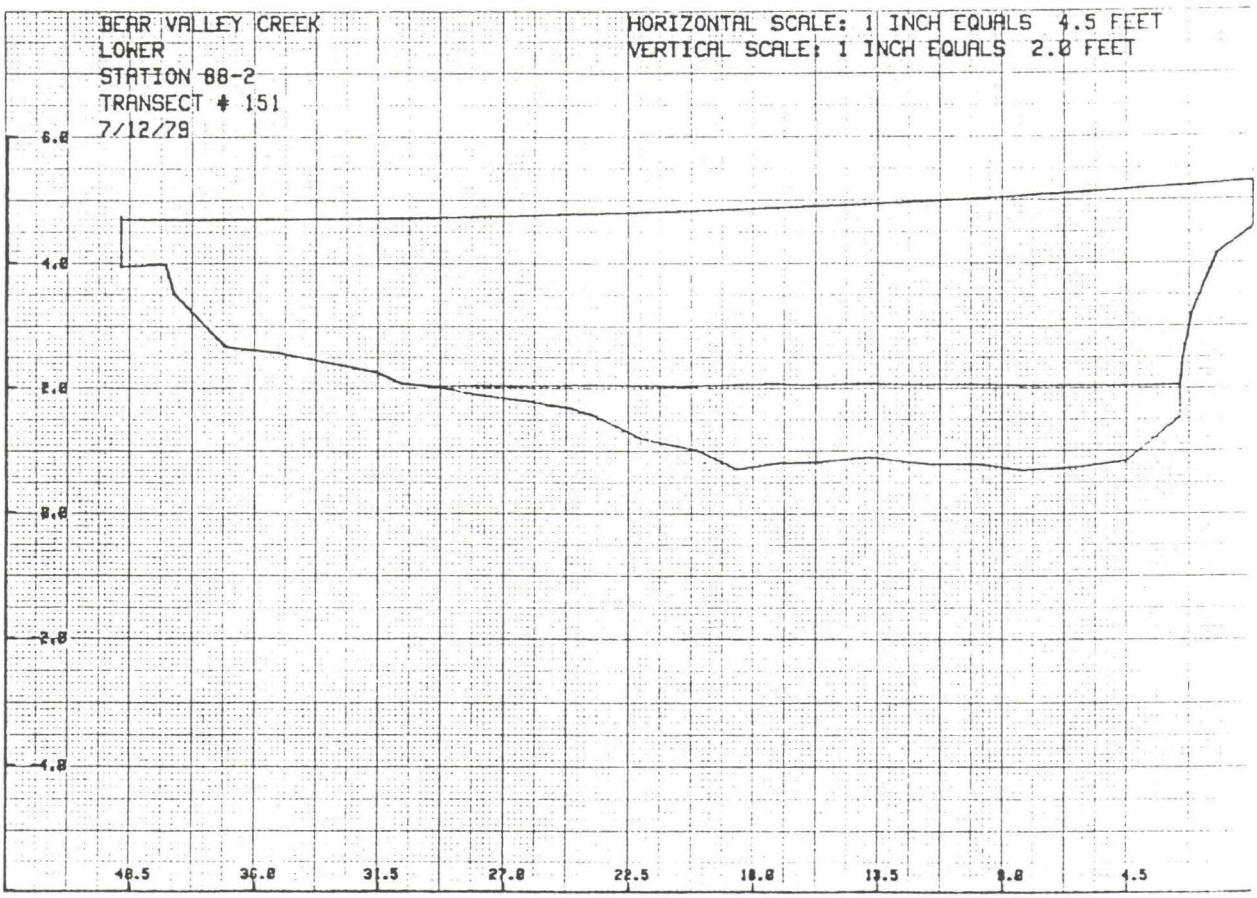
APPENDIX 4

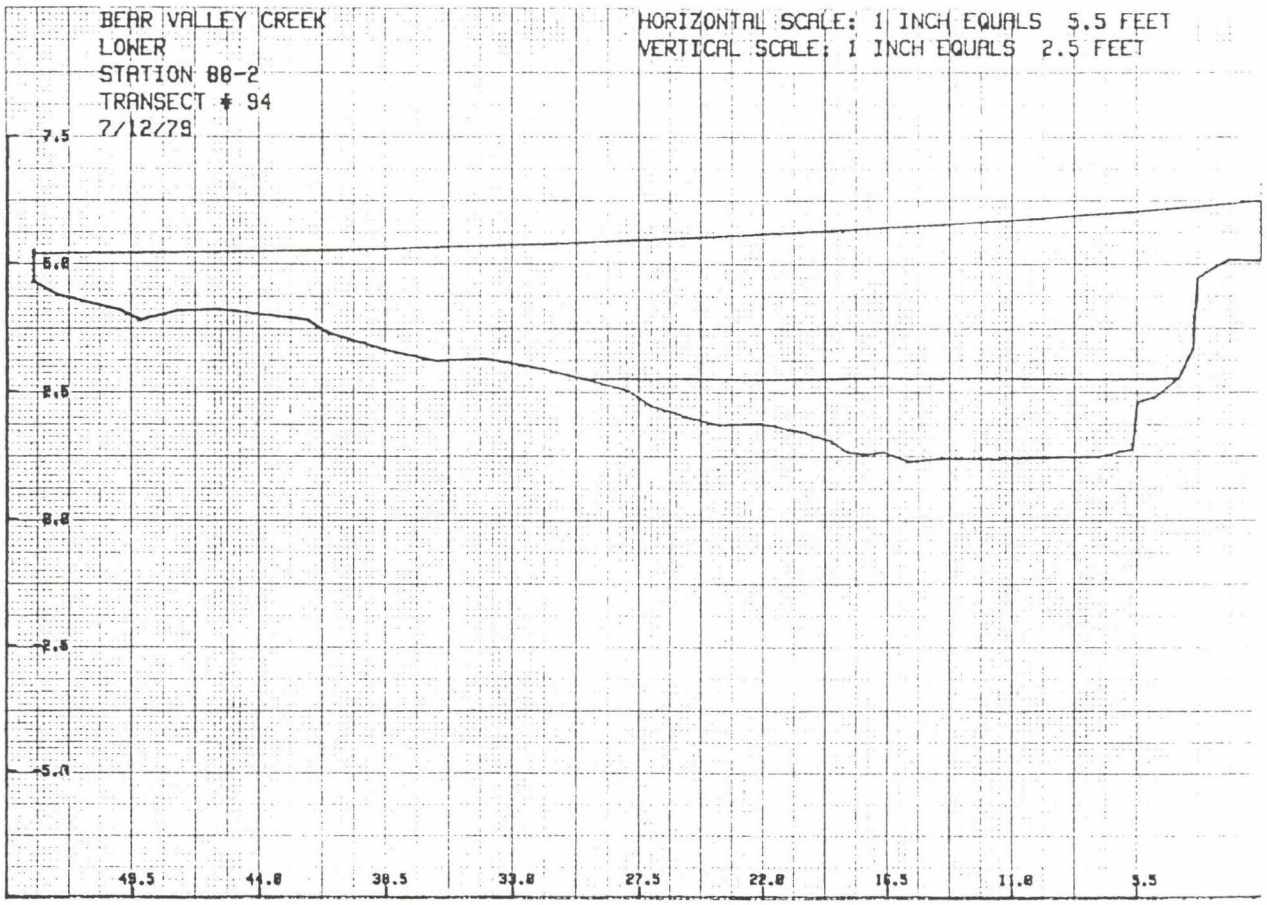
Annual fish population analysis results for Lower Bear Valley

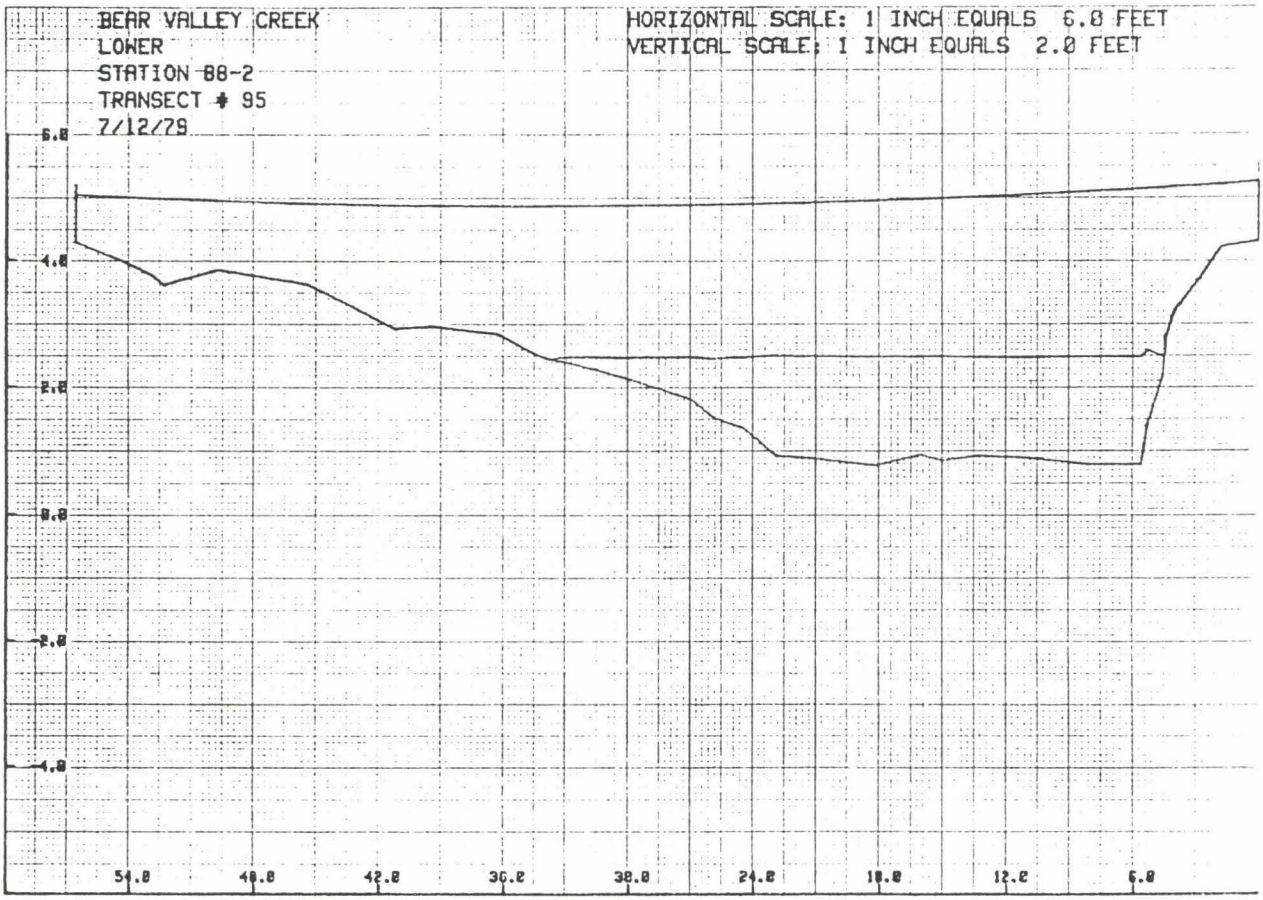

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 148
7/12/79
HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
36.0
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0

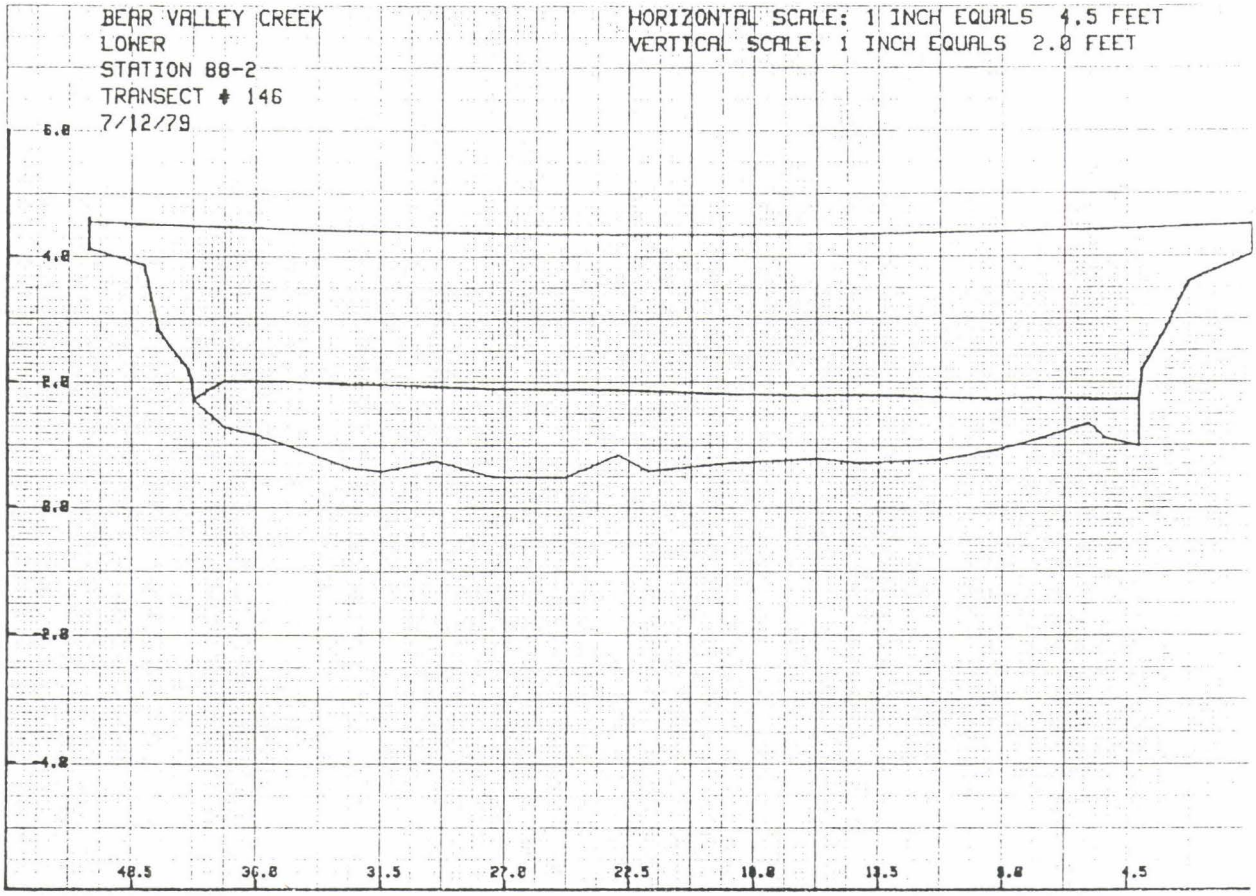

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 149
7/12/79
HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
36.0
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0

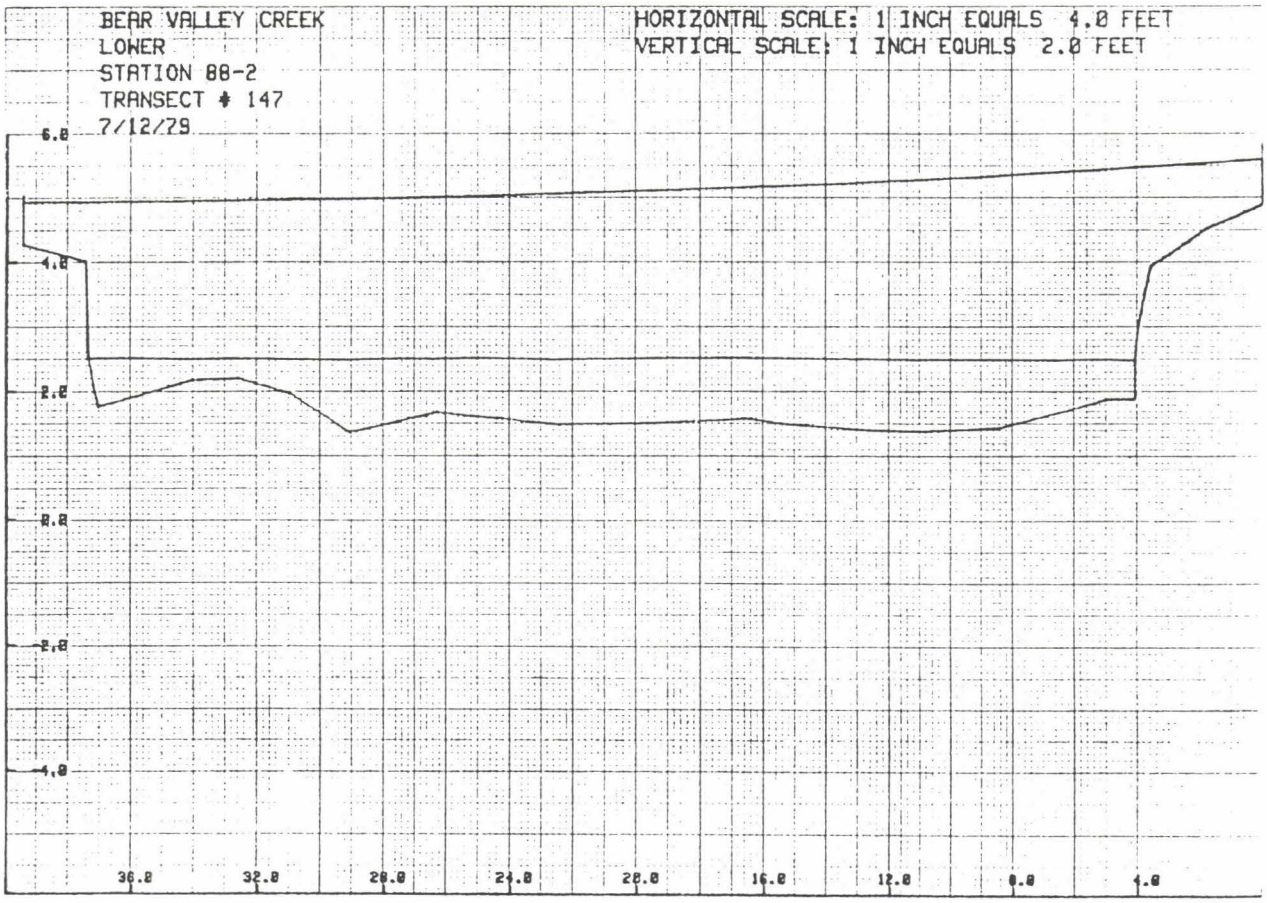

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 150
7/12/79
HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
36.0
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0

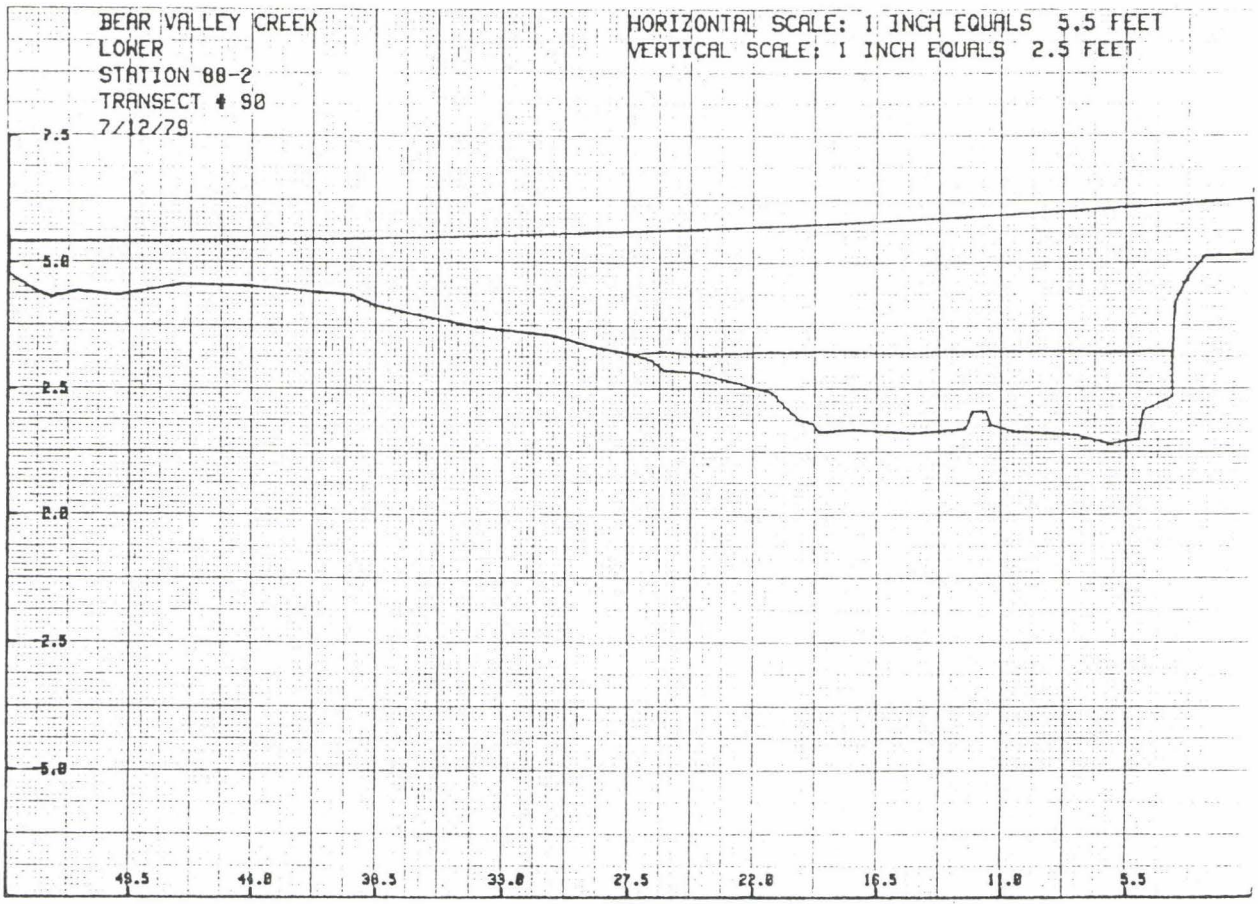

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 151
7/12/79
HORIZONTAL SCALE: 1 INCH EQUALS 4.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
40.5
36.0
31.5
27.0
22.5
18.0
13.5
9.0
4.5

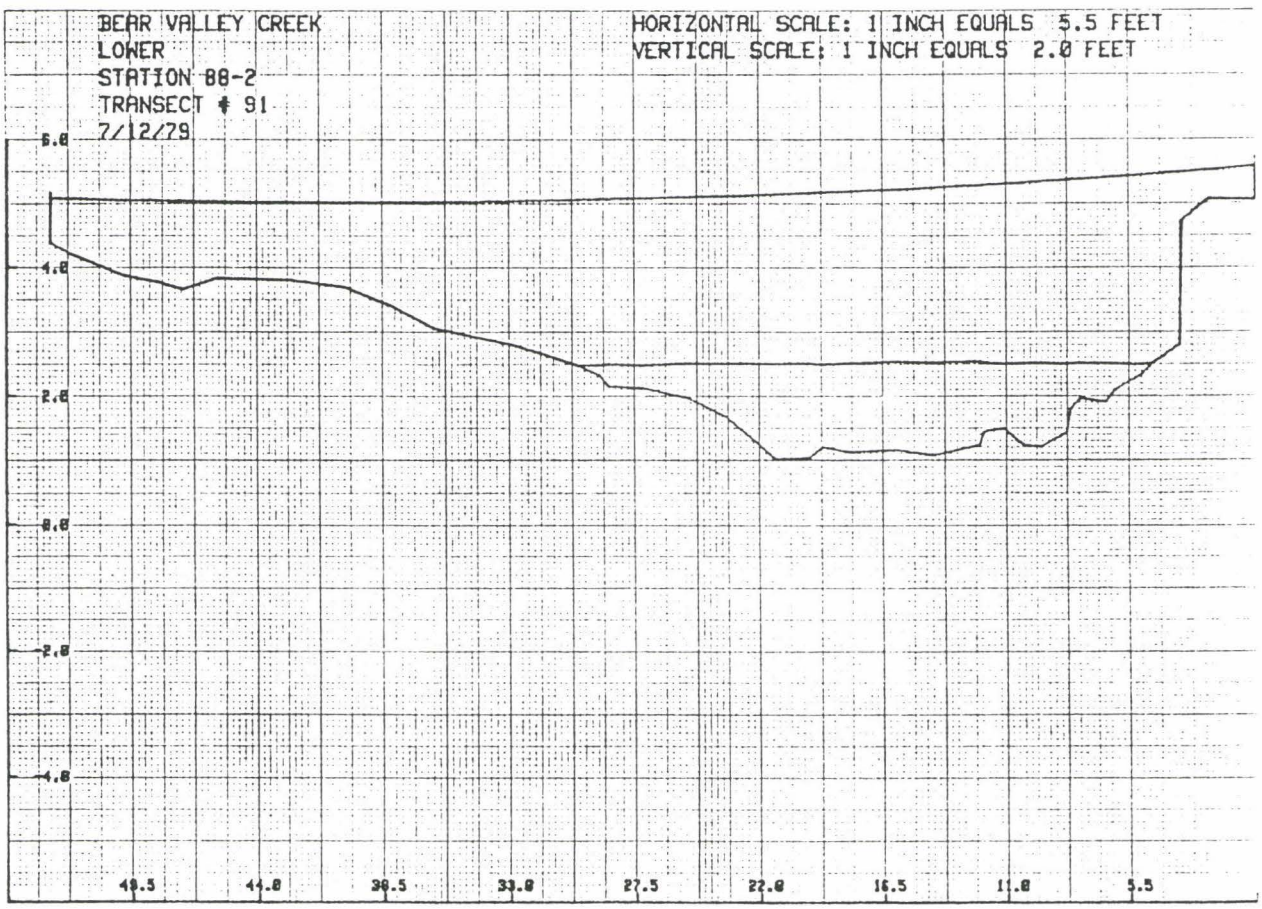

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 94
7/12/79
HORIZONTAL SCALE: 1 INCH EQUALS 5.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
49.5
44.0
38.5
33.0
27.5
22.0
16.5
11.0
5.5

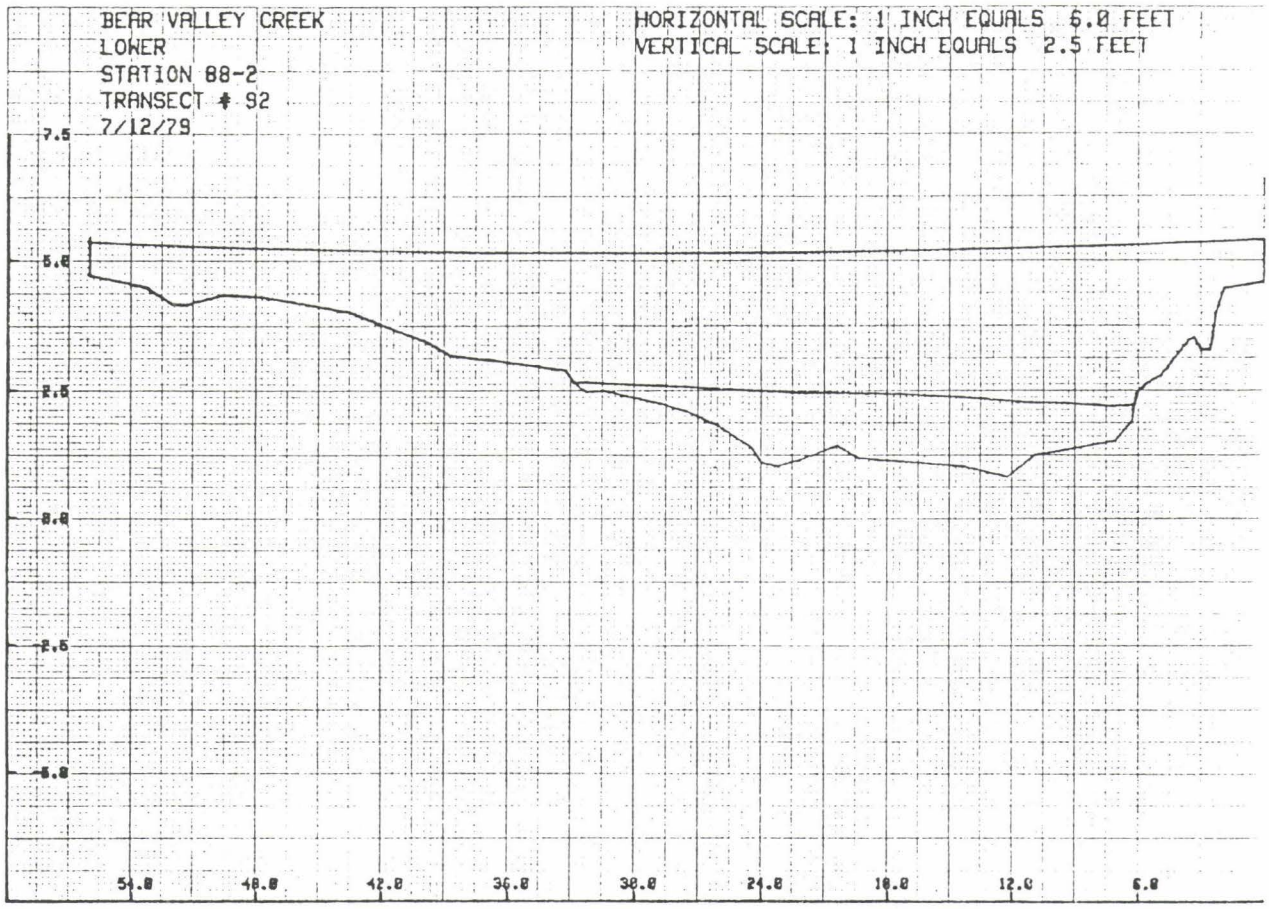

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 95
7/12/79
HORIZONTAL SCALE: 1 INCH EQUALS 6.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
54.0
48.0
42.0
36.0
30.0
24.0
18.0
12.0
6.0

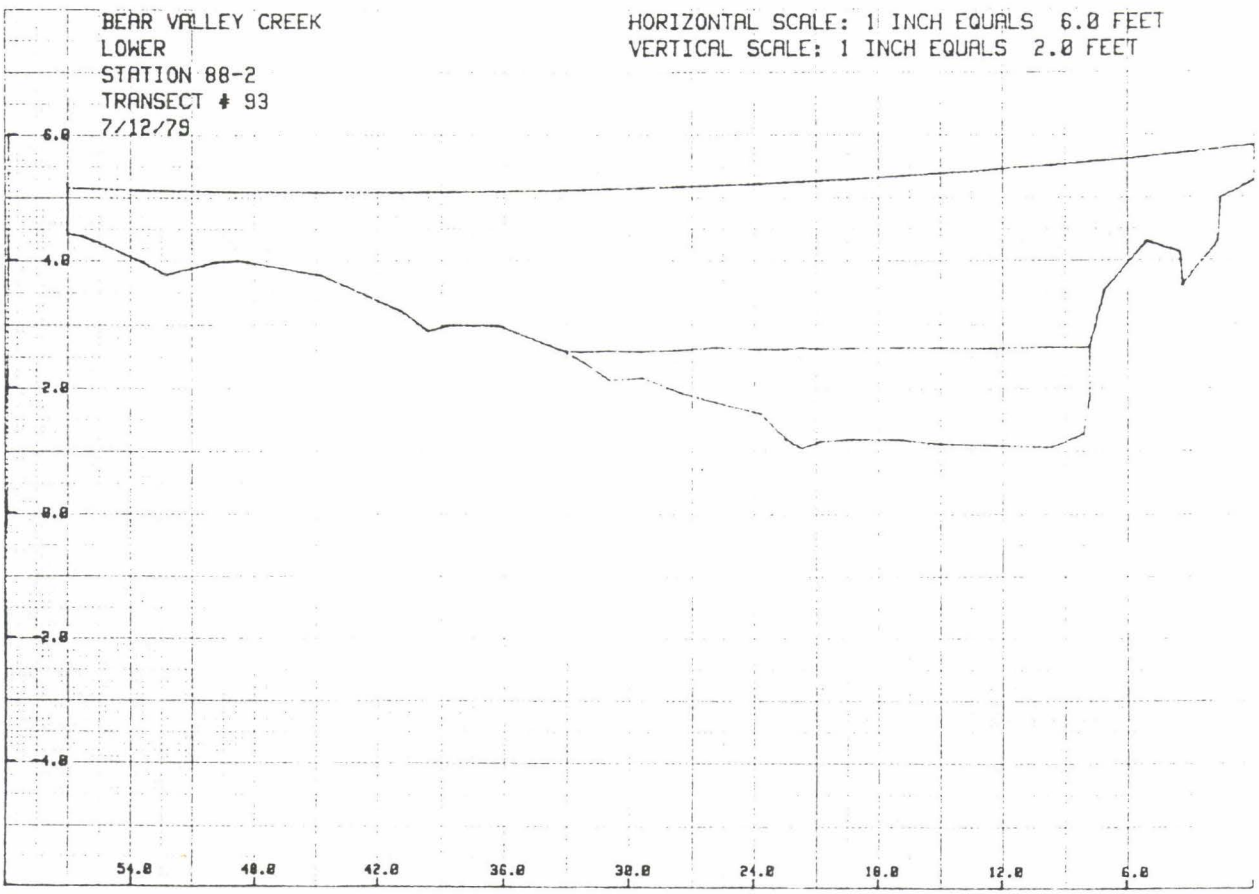

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 146
7/12/79
HORIZONTAL SCALE: 1 INCH EQUALS 4.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
48.5
36.0
31.5
27.0
22.5
18.0
13.5
9.0
4.5

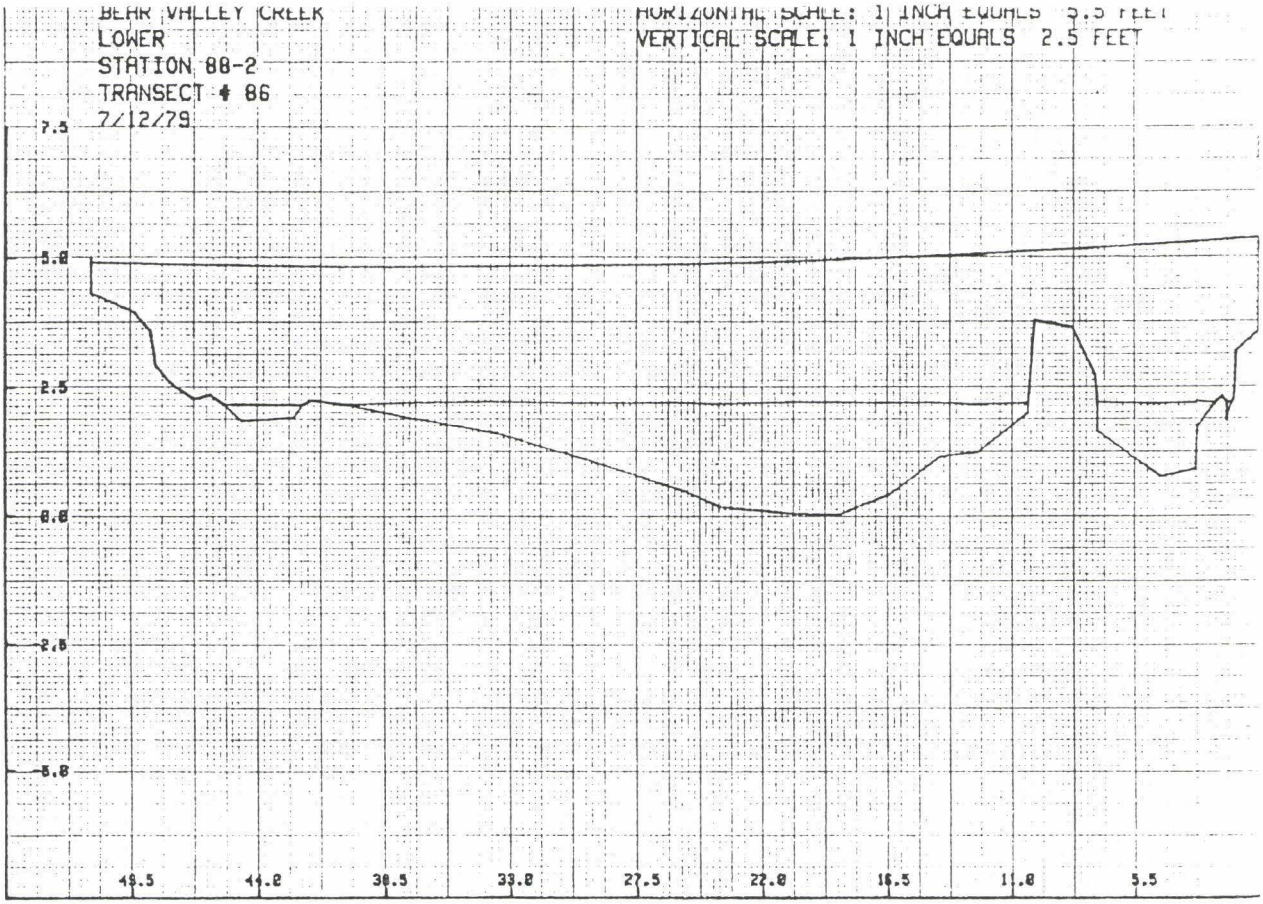

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 147
7/12/79
HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
36.0
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0

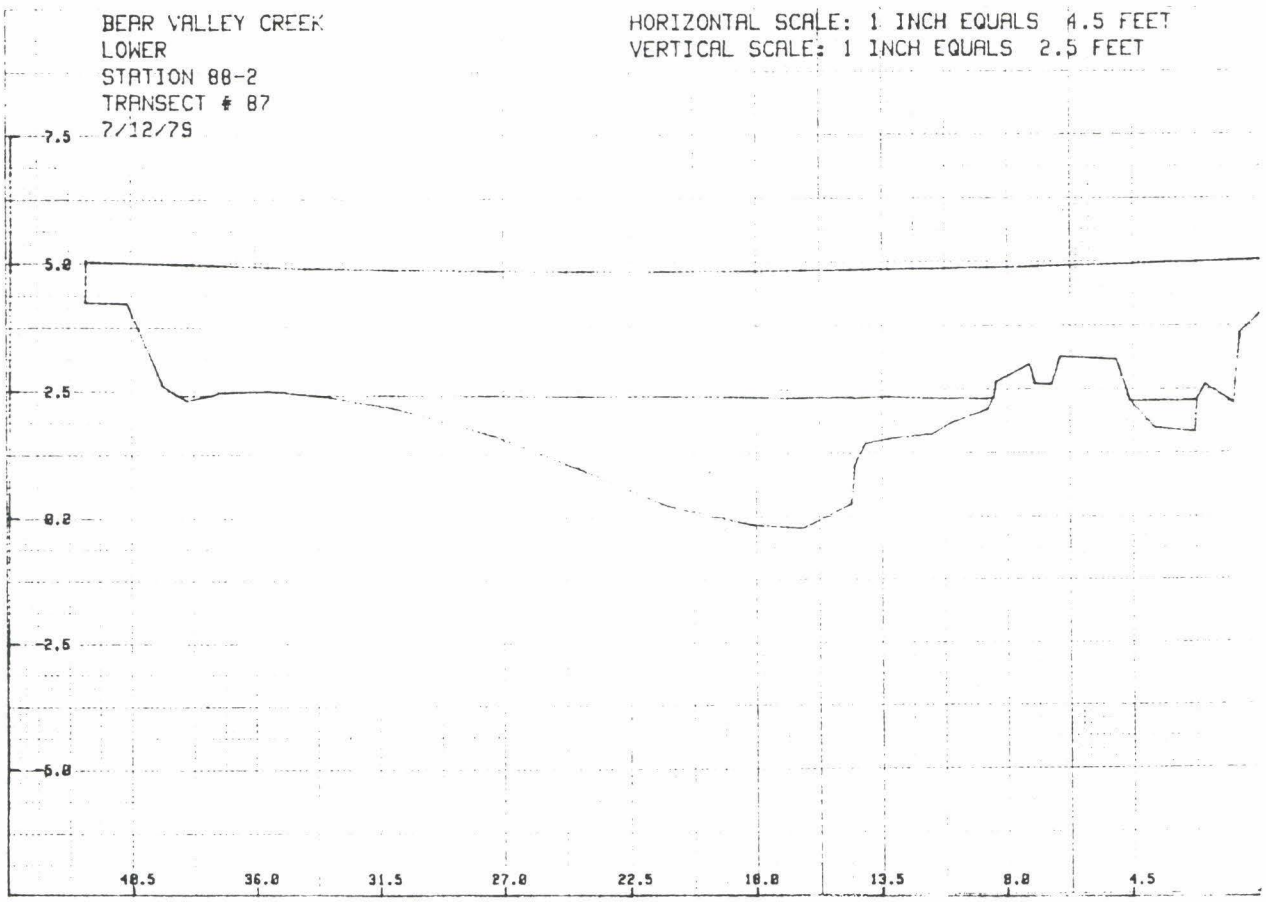

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 90
7/12/79
HORIZONTAL SCALE: 1 INCH EQUALS 5.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
49.5
44.0
38.5
33.0
27.5
22.0
16.5
11.0
5.5

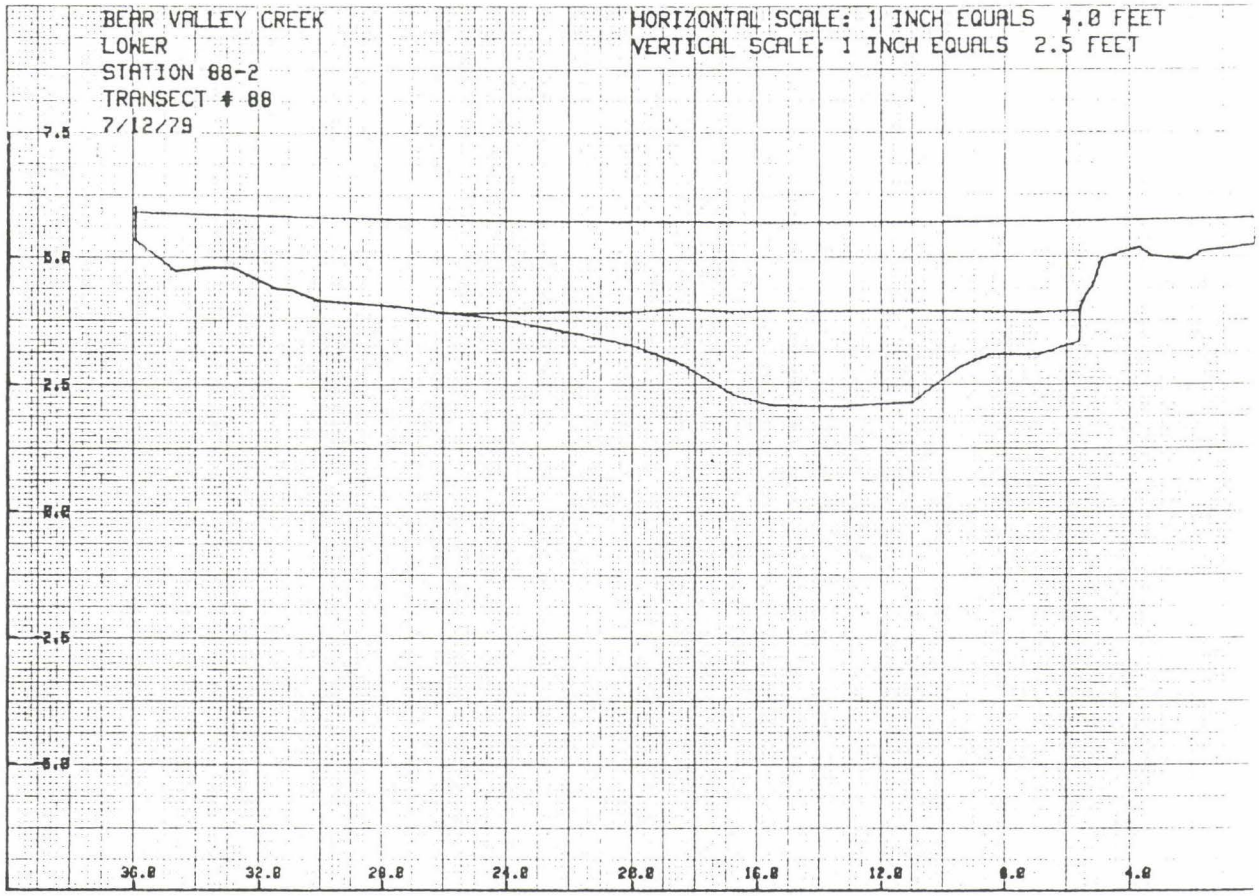

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 91
7/12/79
HORIZONTAL SCALE: 1 INCH EQUALS 5.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
49.5
44.0
38.5
33.0
27.5
22.0
16.5
11.0
5.5

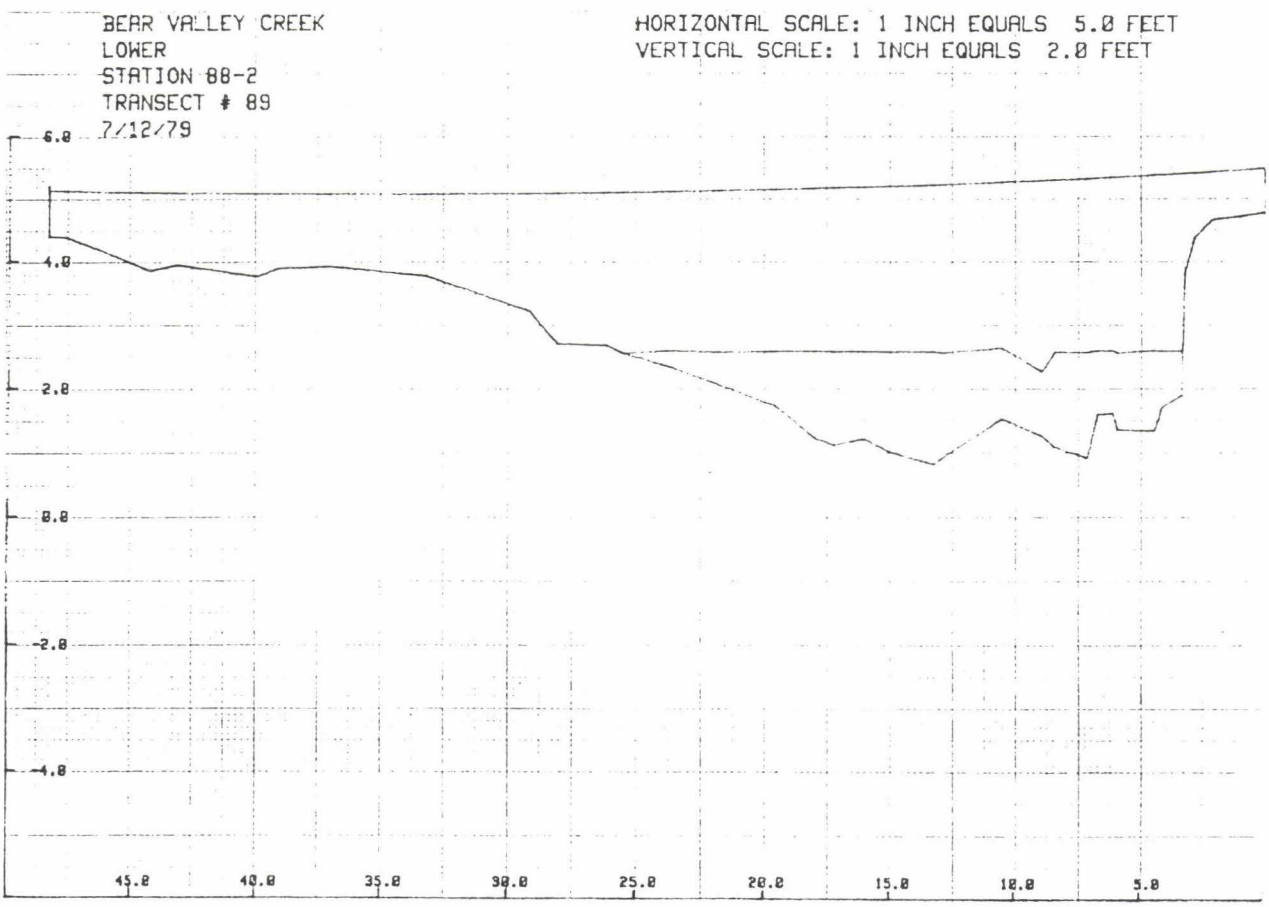

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 92
7/12/79
HORIZONTAL SCALE: 1 INCH EQUALS 6.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
54.0
48.0
42.0
36.0
30.0
24.0
18.0
12.0
6.0

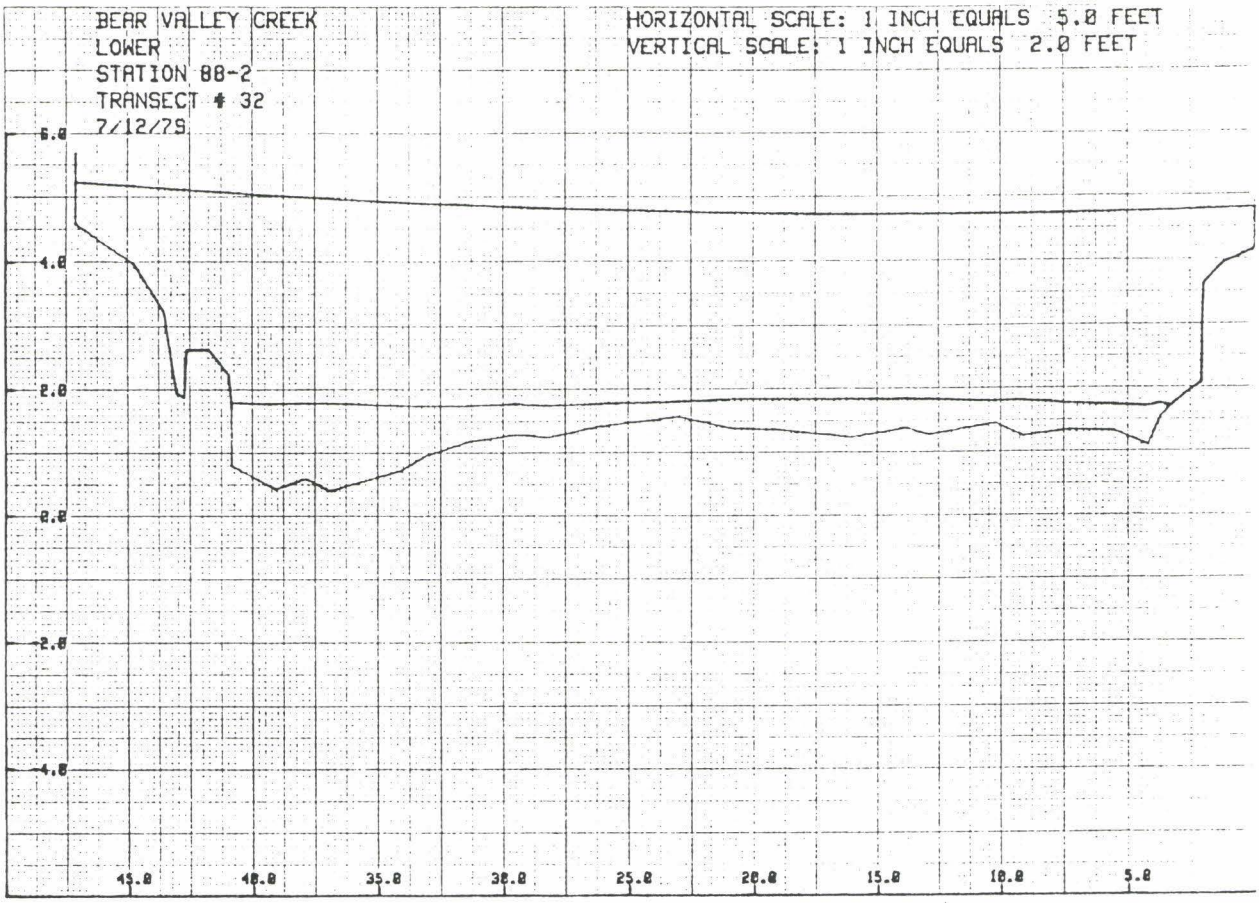

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 93
7/12/79
HORIZONTAL SCALE: 1 INCH EQUALS 6.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
54.0
48.0
42.0
36.0
30.0
24.0
18.0
12.0
6.0

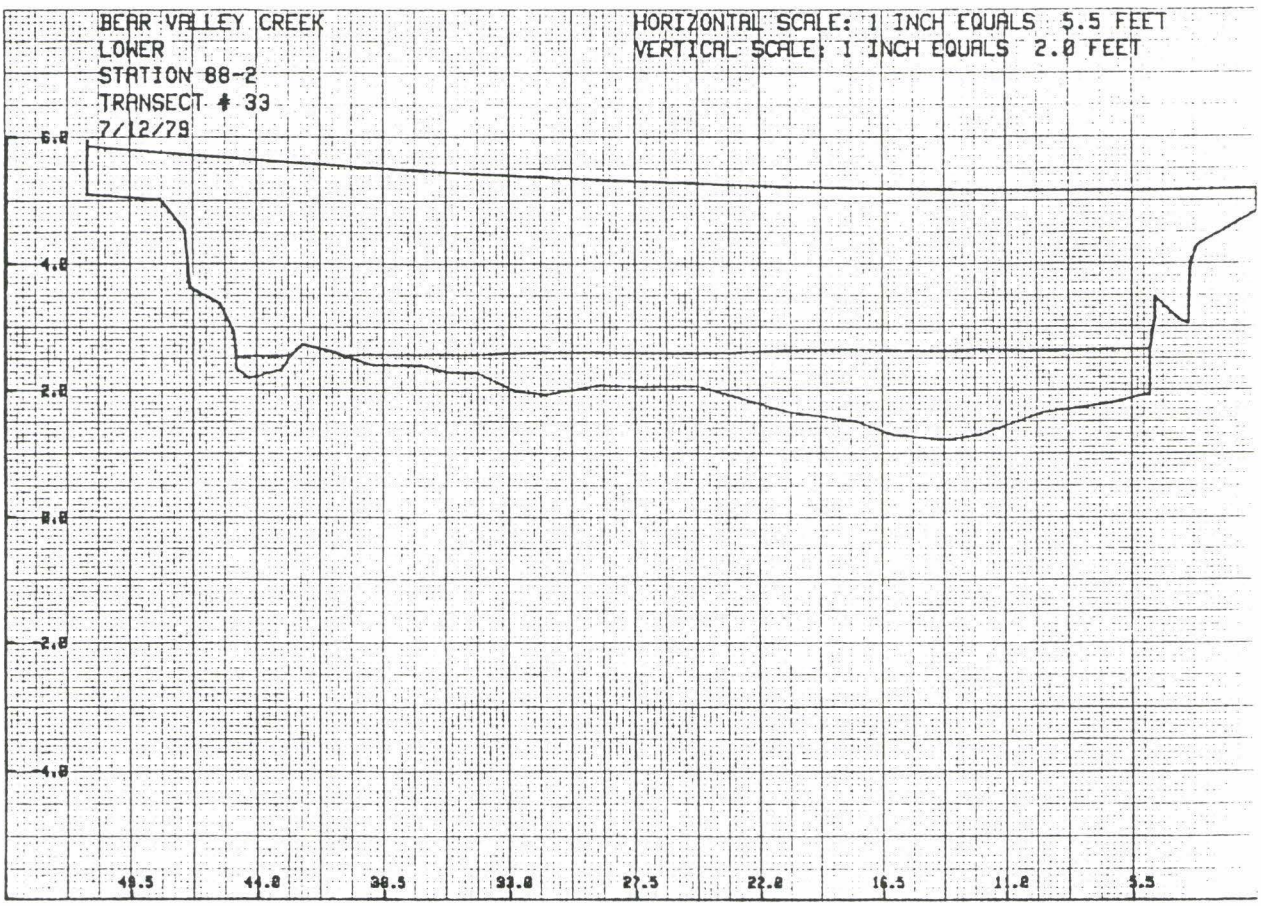

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 86
7/12/79
HORIZONTAL SCALE: 1 INCH EQUALS 5.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
49.5
44.0
38.5
33.0
27.5
22.0
16.5
11.0
5.5

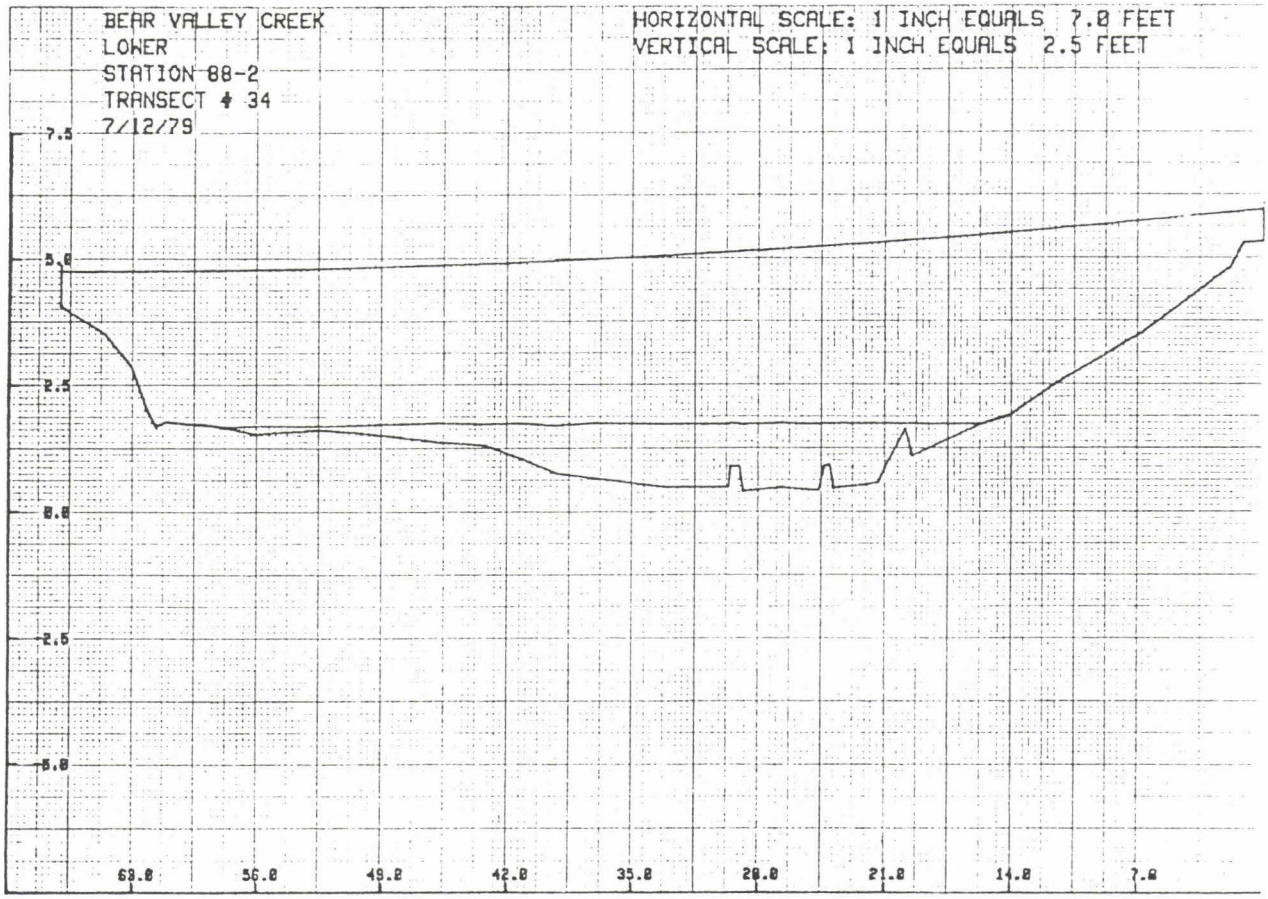

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 87
7/12/79
HORIZONTAL SCALE: 1 INCH EQUALS 4.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
40.5
36.0
31.5
27.0
22.5
18.0
13.5
9.0
4.5

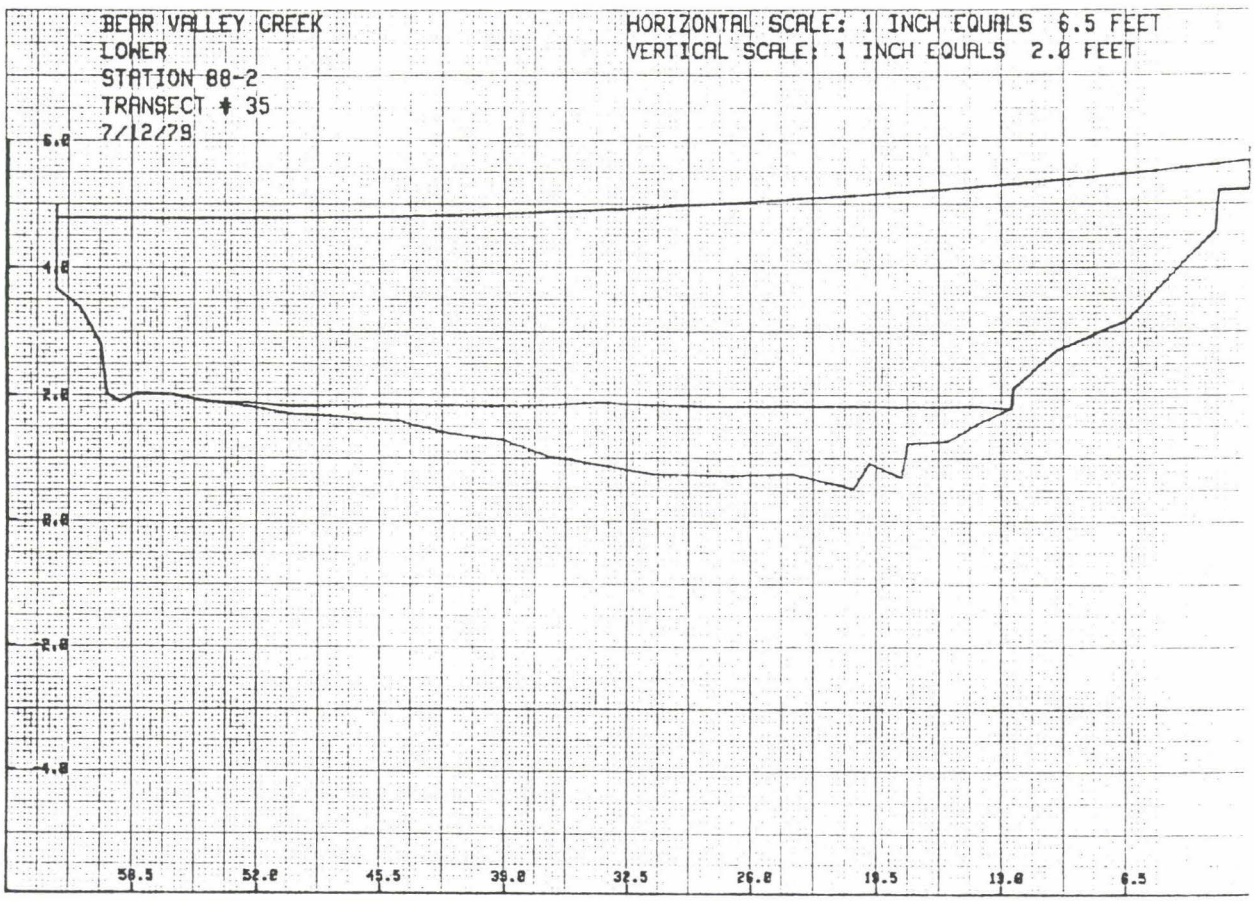

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 88
7/12/79
HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
36.0
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0

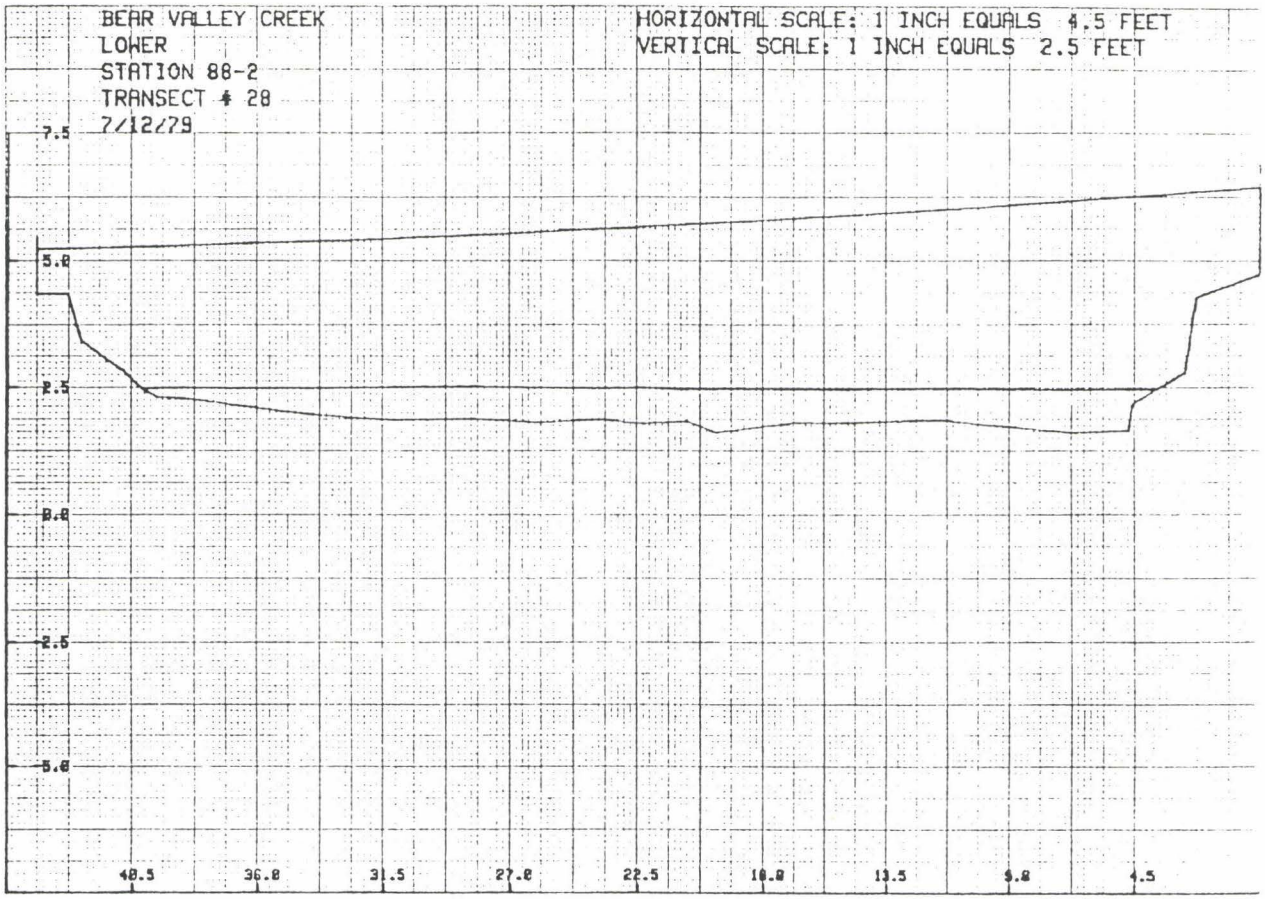

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 89
7/12/79
HORIZONTAL SCALE: 1 INCH EQUALS 5.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0

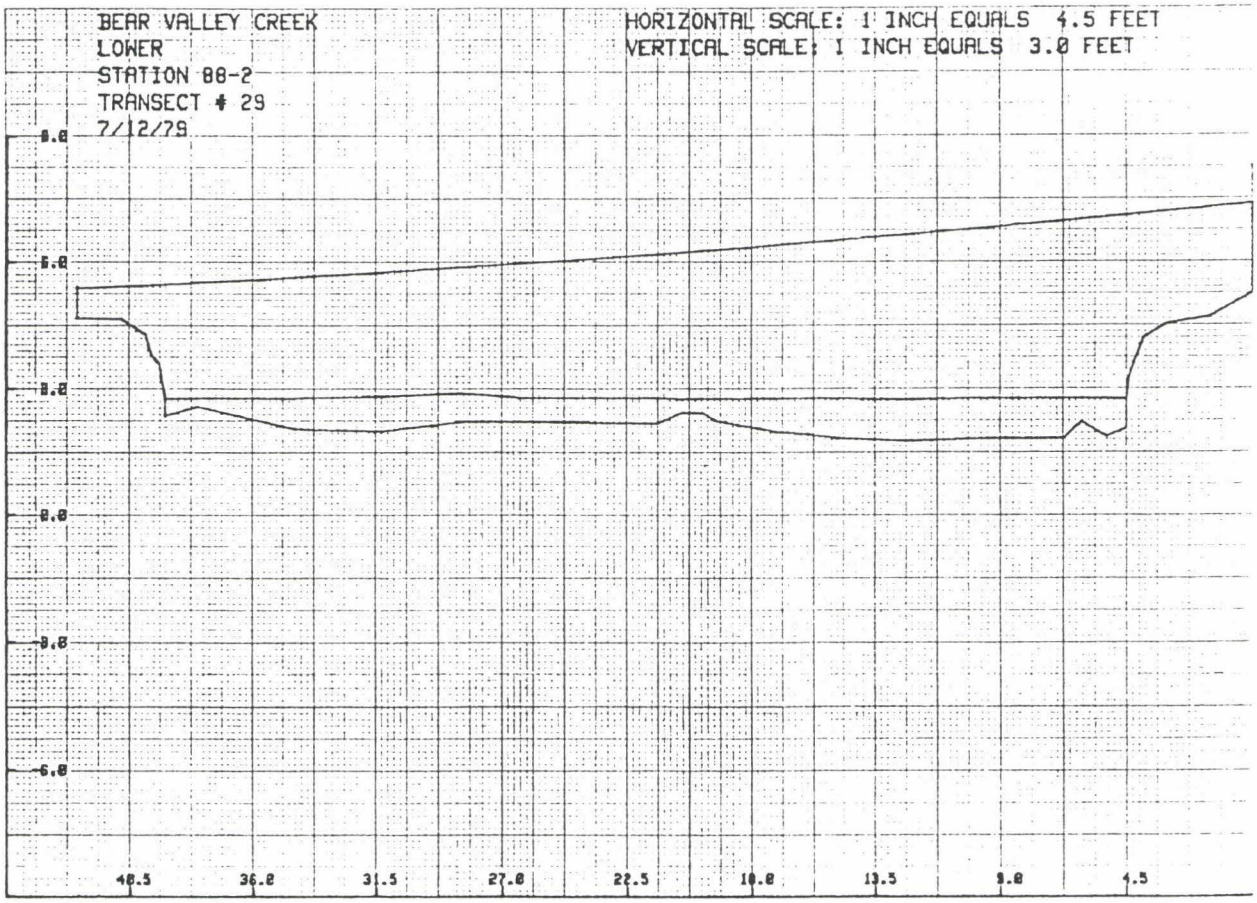

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 32
7/12/79
HORIZONTAL SCALE: 1 INCH EQUALS 5.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0

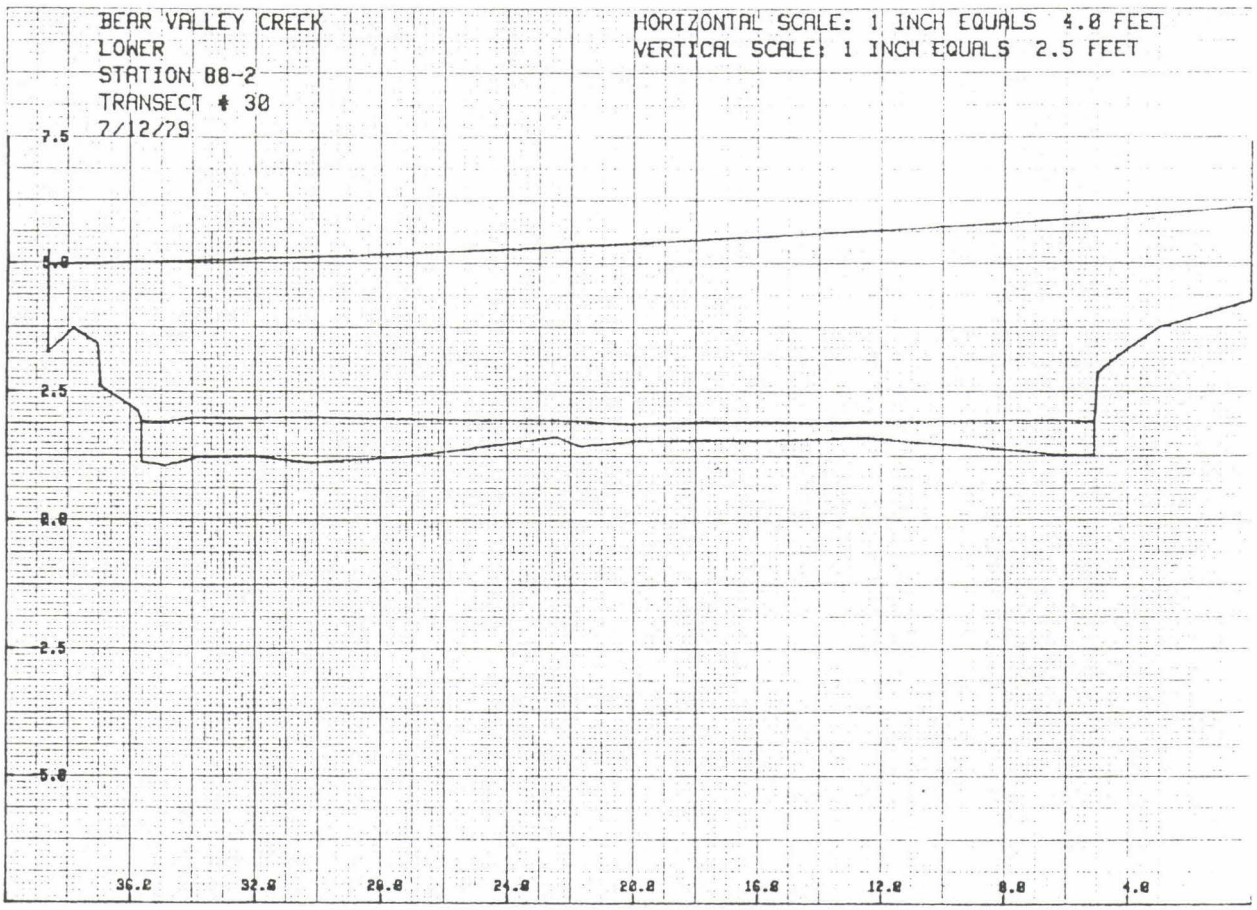

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 33
7/12/79
HORIZONTAL SCALE: 1 INCH EQUALS 5.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
49.5
44.0
38.5
33.0
27.5
22.0
16.5
11.0
5.5

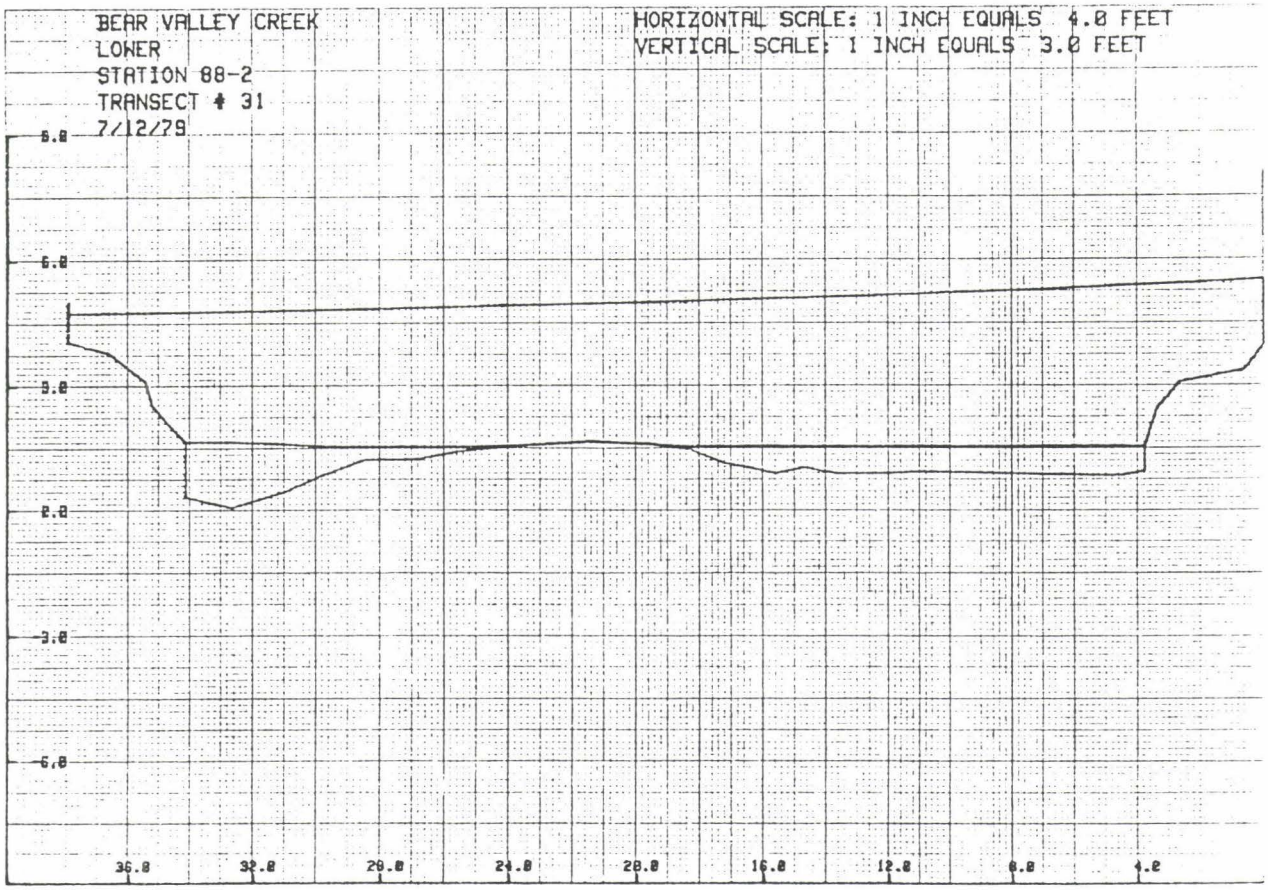

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 34
7/12/79
HORIZONTAL SCALE: 1 INCH EQUALS 7.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
63.0
56.0
49.0
42.0
35.0
28.0
21.0
14.0
7.0

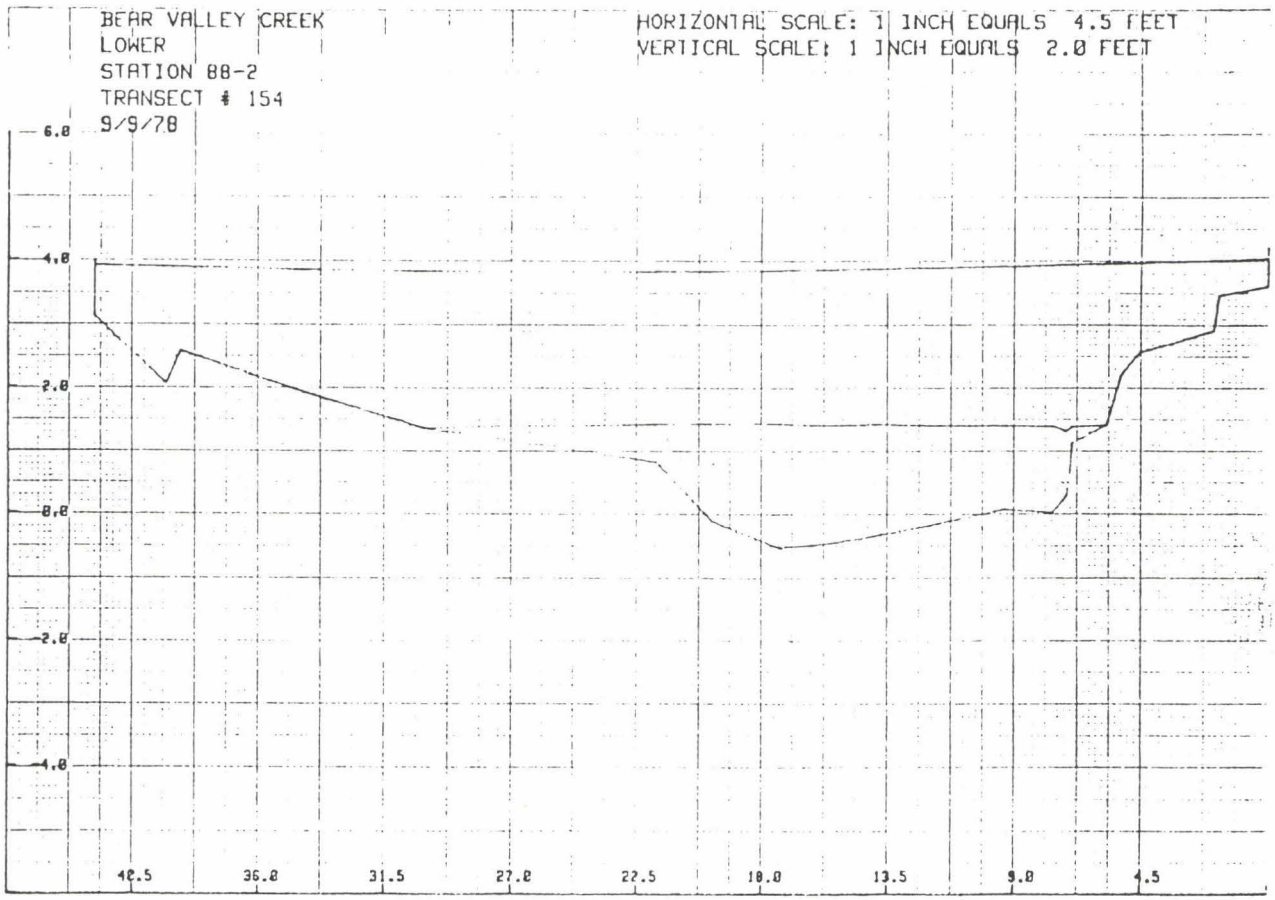

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 35
7/12/79
HORIZONTAL SCALE: 1 INCH EQUALS 6.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
58.5
52.0
45.5
39.0
32.5
26.0
19.5
13.0
6.5

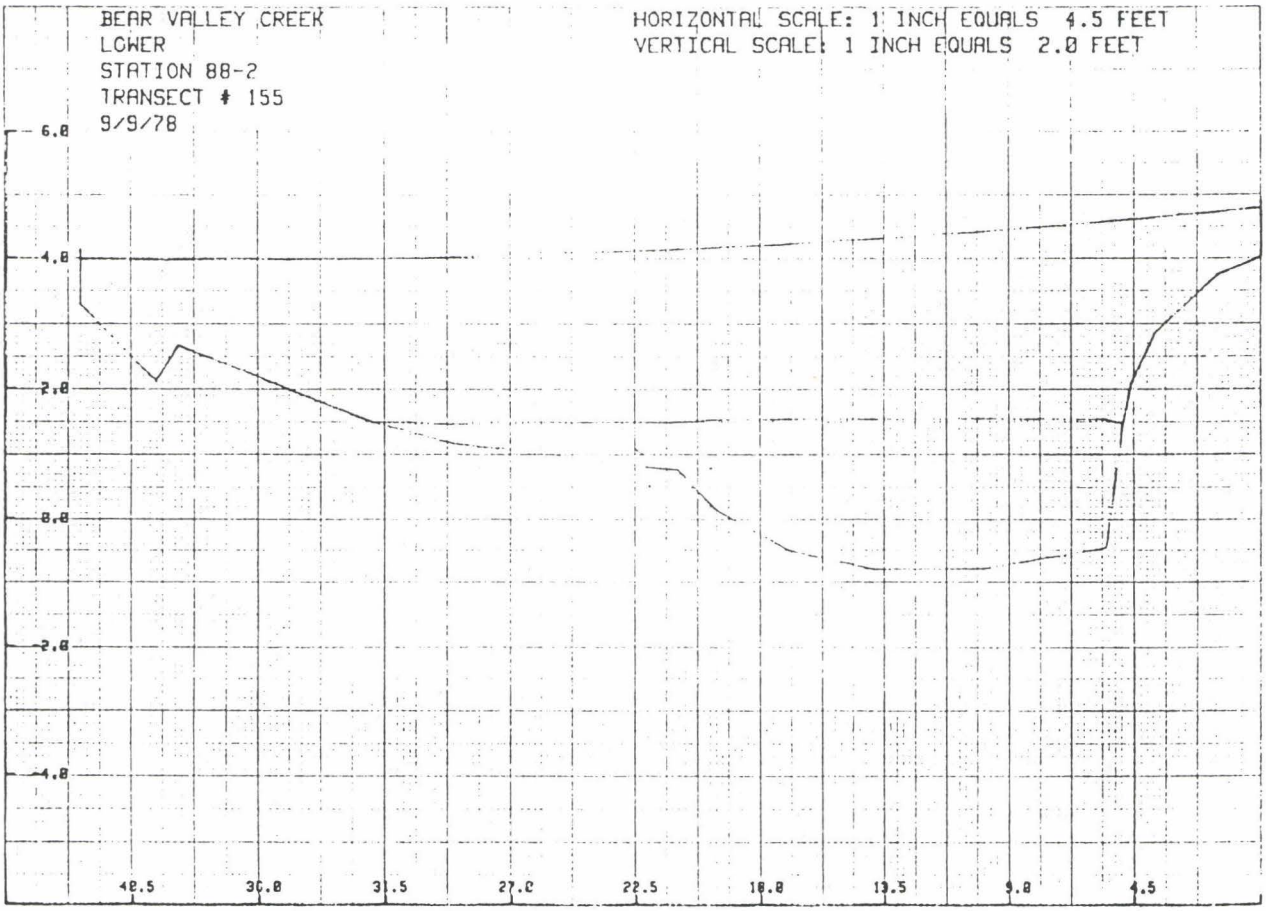

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 28
7/12/79
HORIZONTAL SCALE: 1 INCH EQUALS 4.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
48.5
36.0
31.5
27.0
22.5
18.0
13.5
9.0
4.5

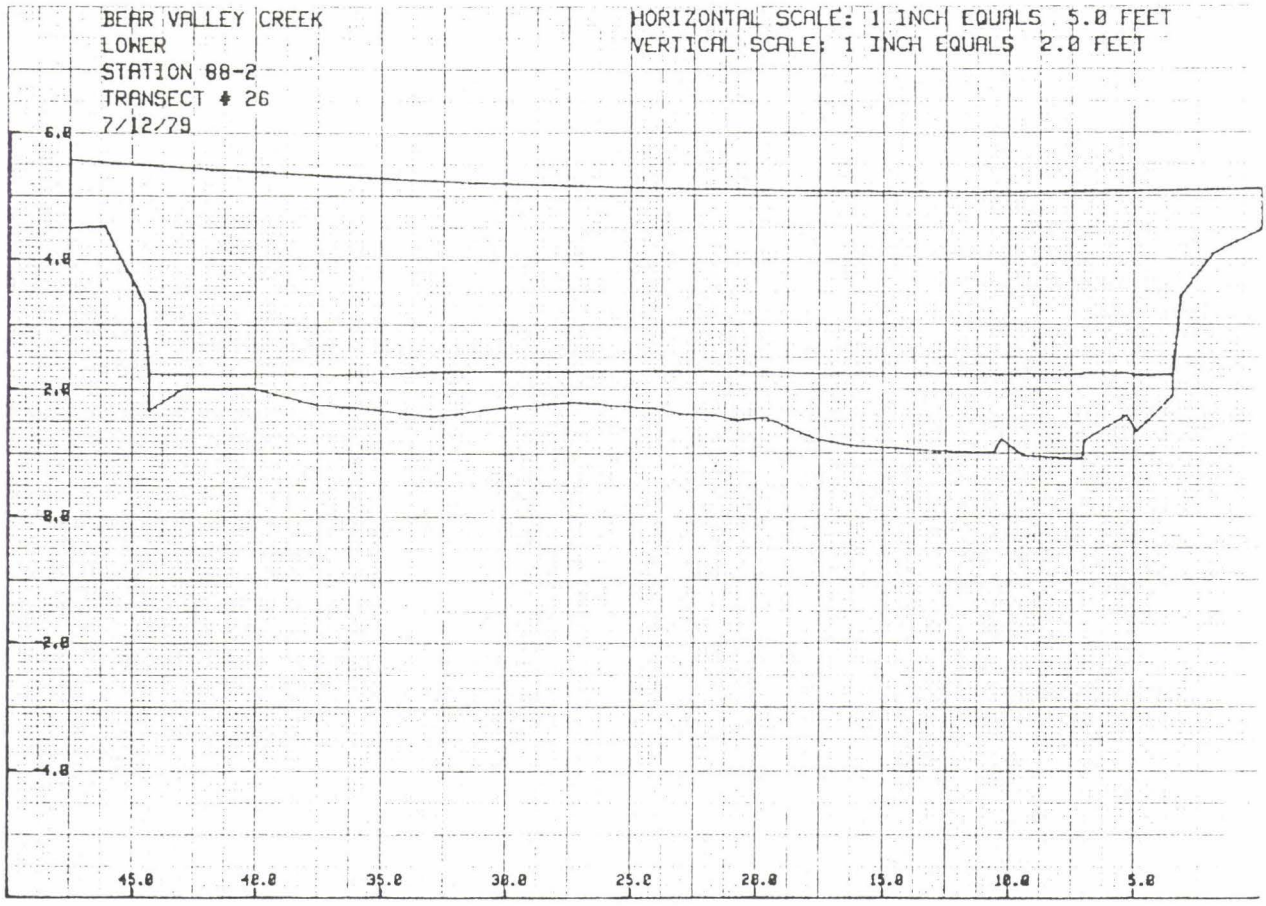

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 29
7/12/79
HORIZONTAL SCALE: 1 INCH EQUALS 4.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 3.0 FEET
6.0
3.0
0.0
-3.0
-6.0
48.5
36.0
31.5
27.0
22.5
18.0
13.5
9.0
4.5

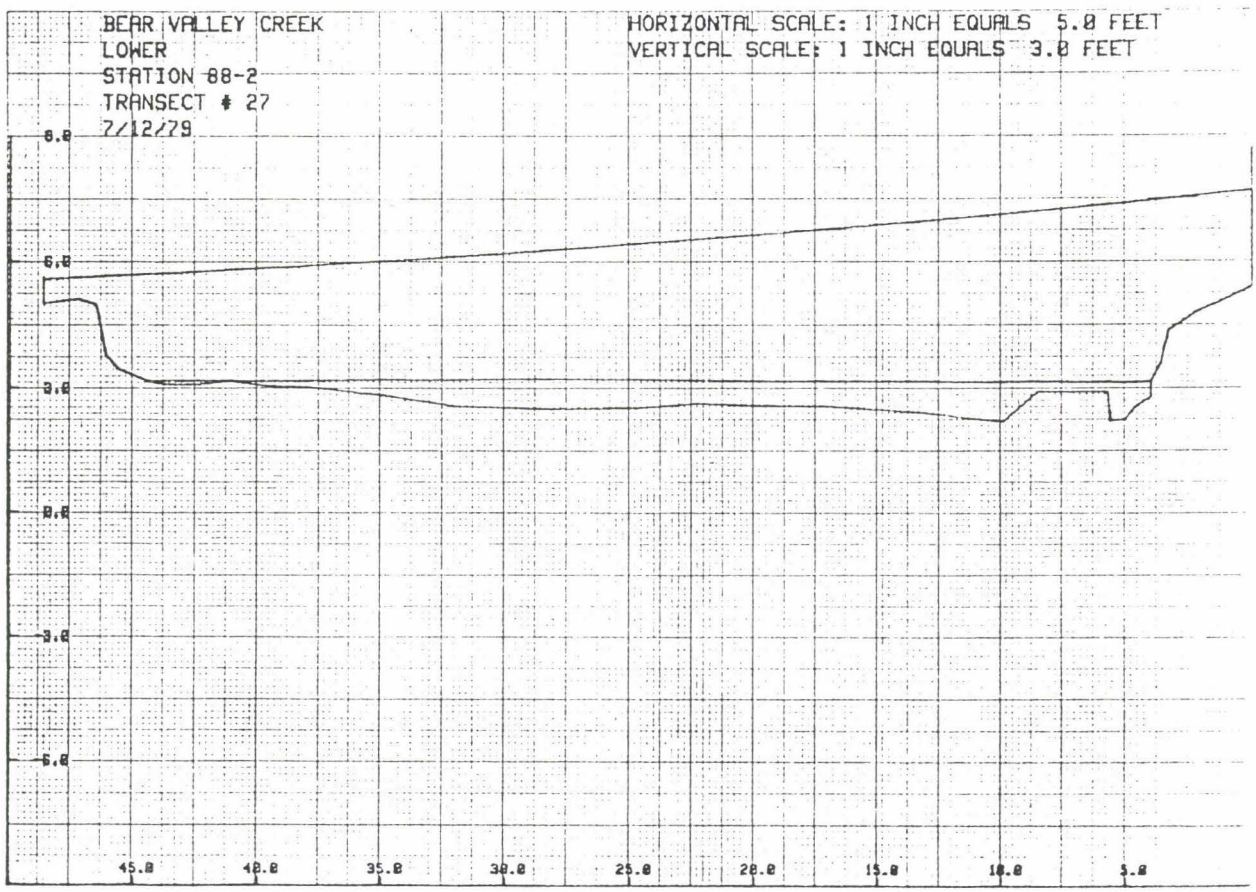

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 30
7/12/79
HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
36.0
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0

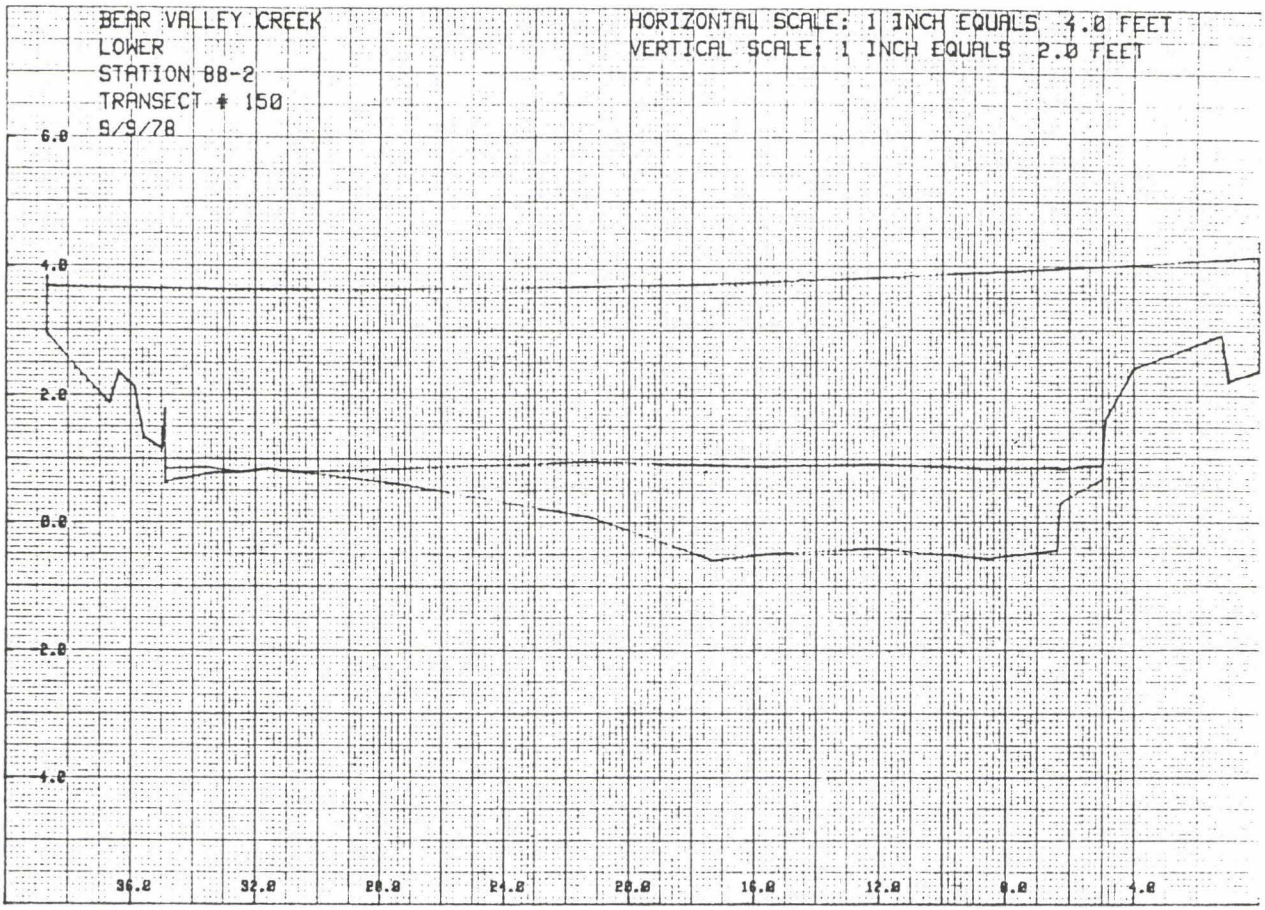

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 31
7/12/79
HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 3.0 FEET
6.0
3.0
0.0
-3.0
-6.0
36.0
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0

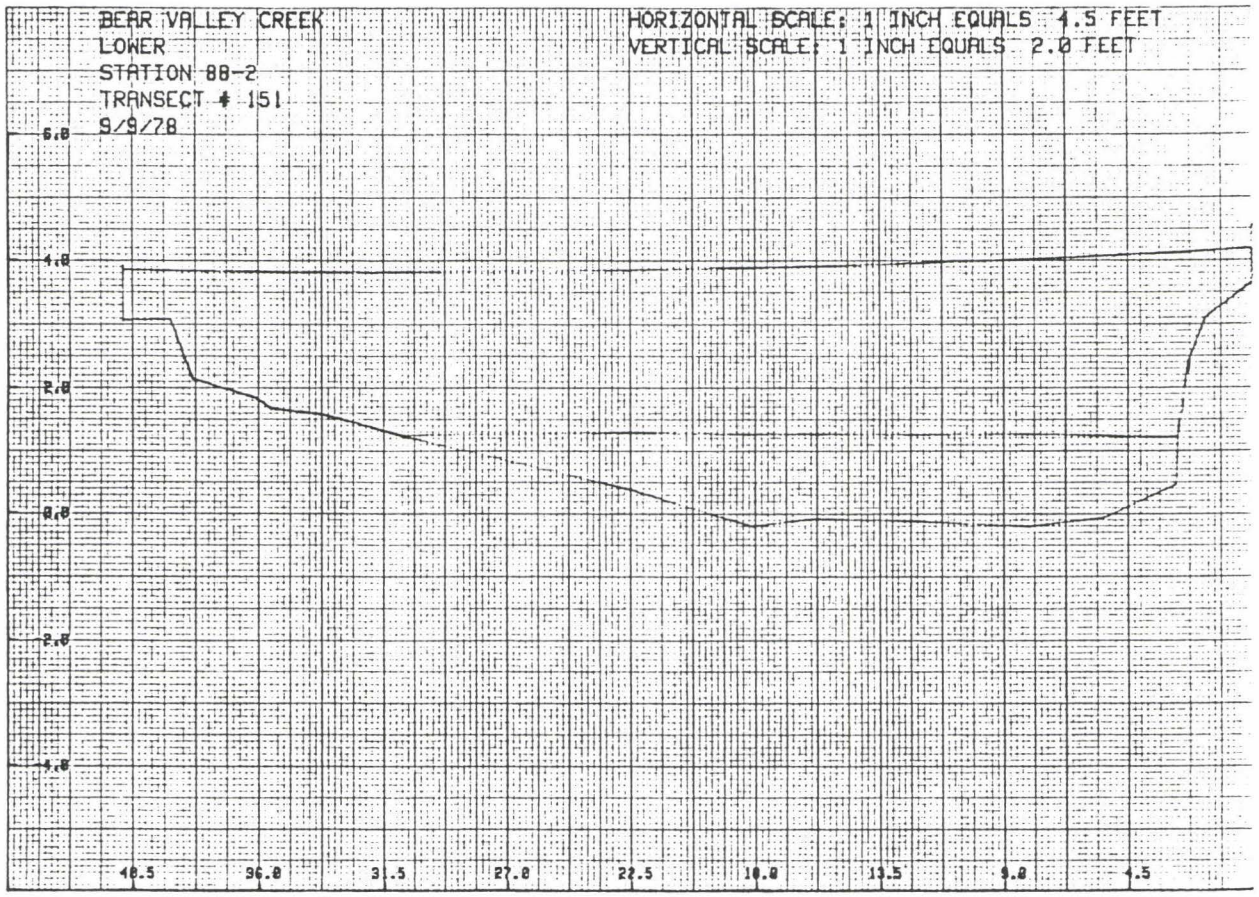

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 154
9/9/78
HORIZONTAL SCALE: 1 INCH EQUALS 4.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
40.5
36.0
31.5
27.0
22.5
18.0
13.5
9.0
4.5

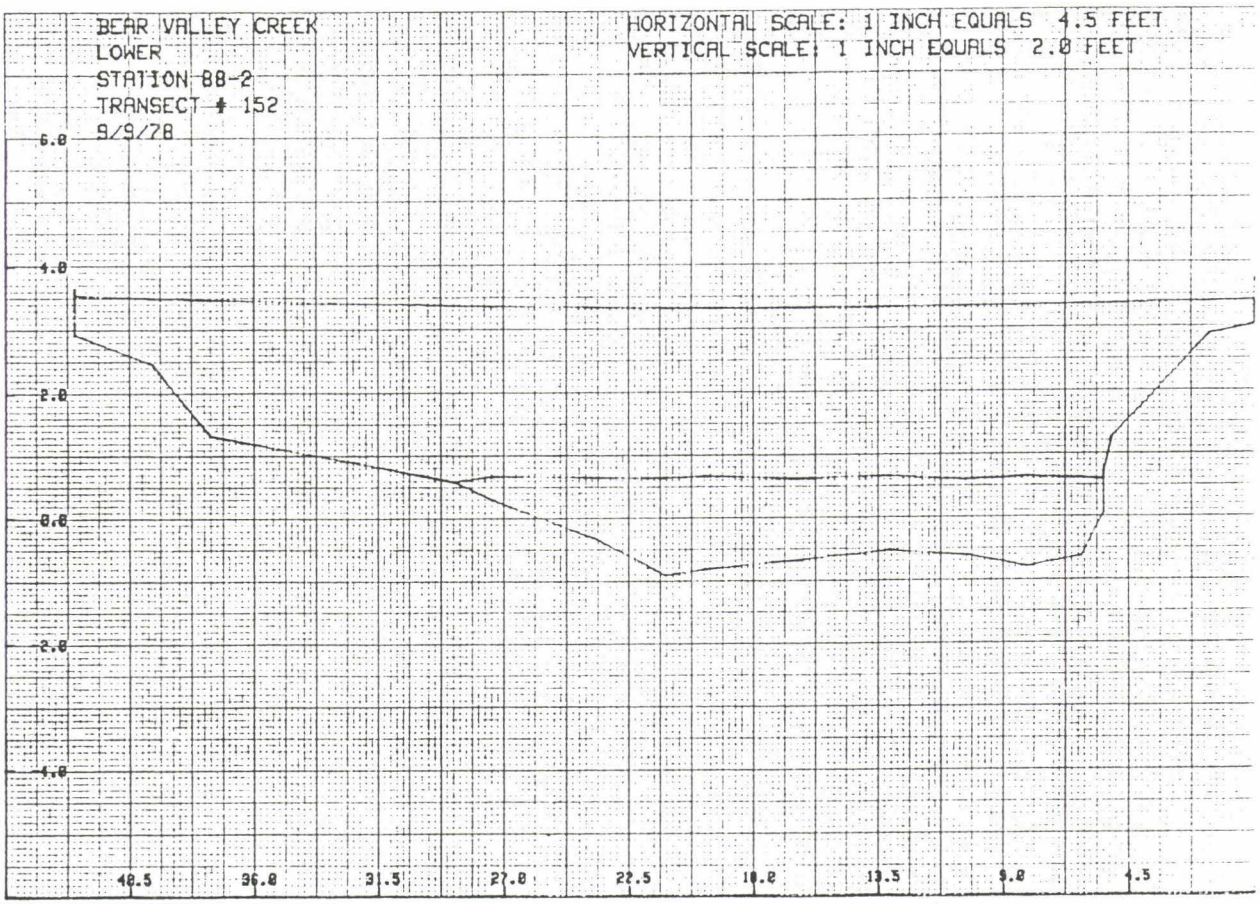

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 155
9/9/78
HORIZONTAL SCALE: 1 INCH EQUALS 4.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
40.5
36.0
31.5
27.0
22.5
18.0
13.5
9.0
4.5

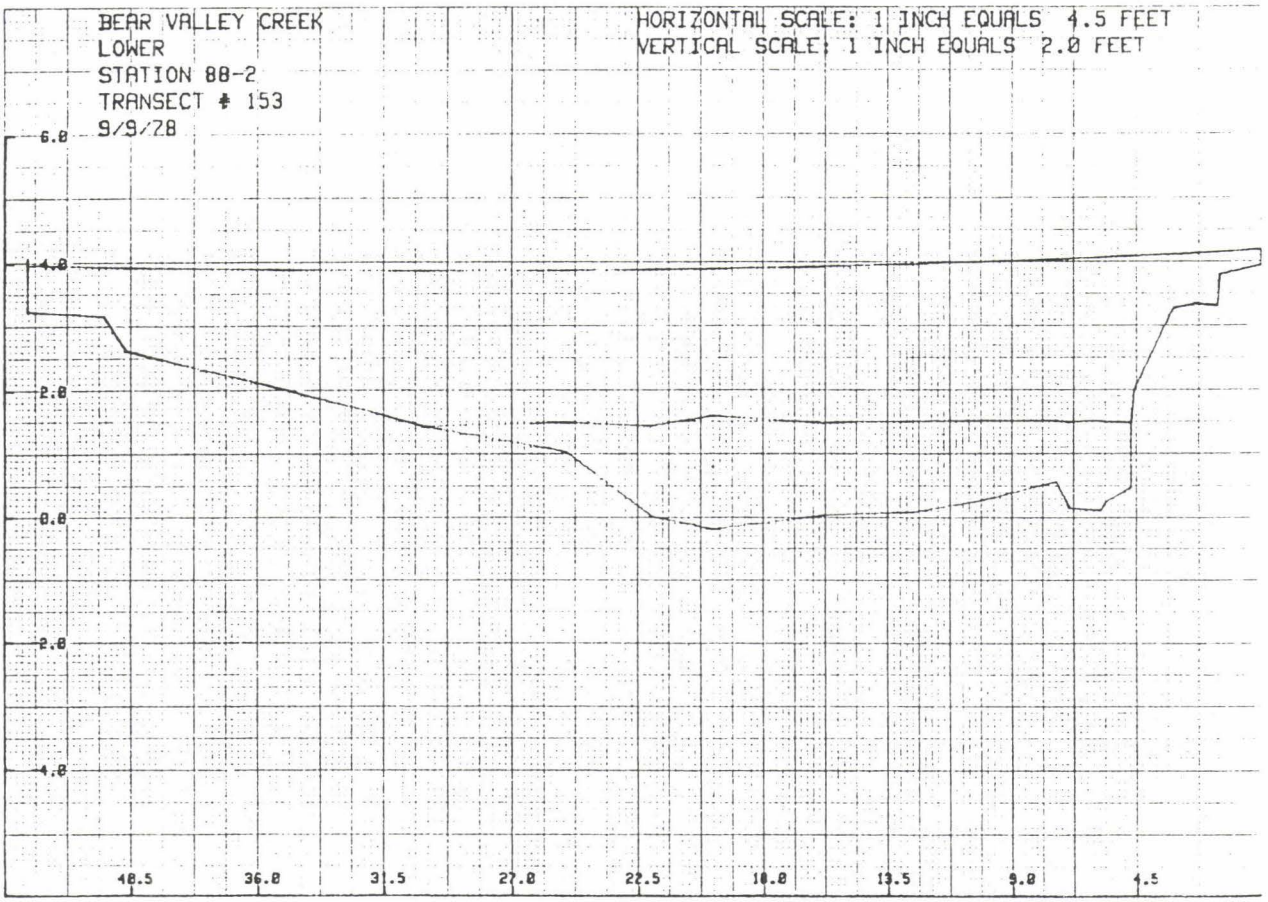

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 26
7/12/79
HORIZONTAL SCALE: 1 INCH EQUALS 5.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0

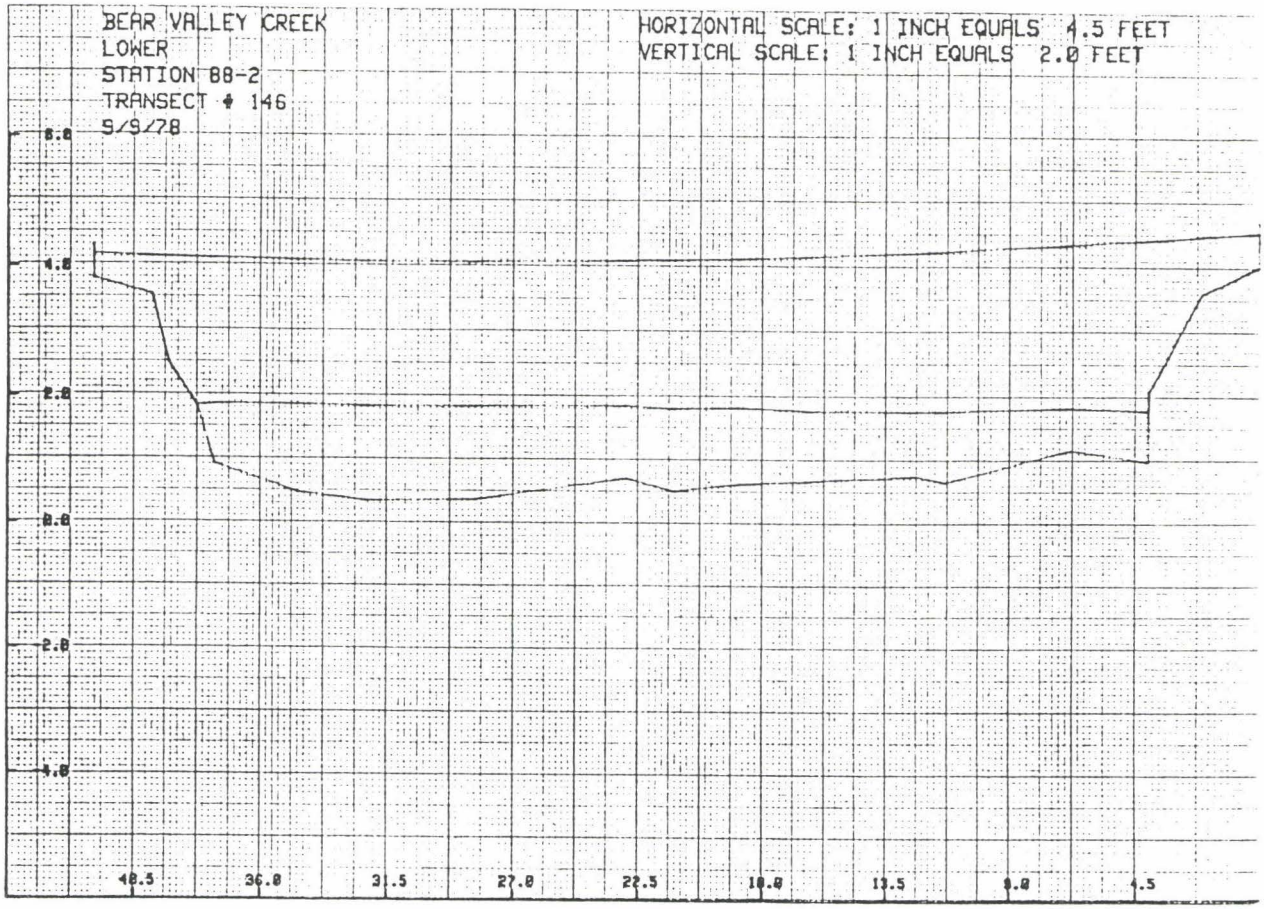

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 27
7/12/79
HORIZONTAL SCALE: 1 INCH EQUALS 5.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 3.0 FEET
8.0
6.0
3.0
0.0
-3.0
-6.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0

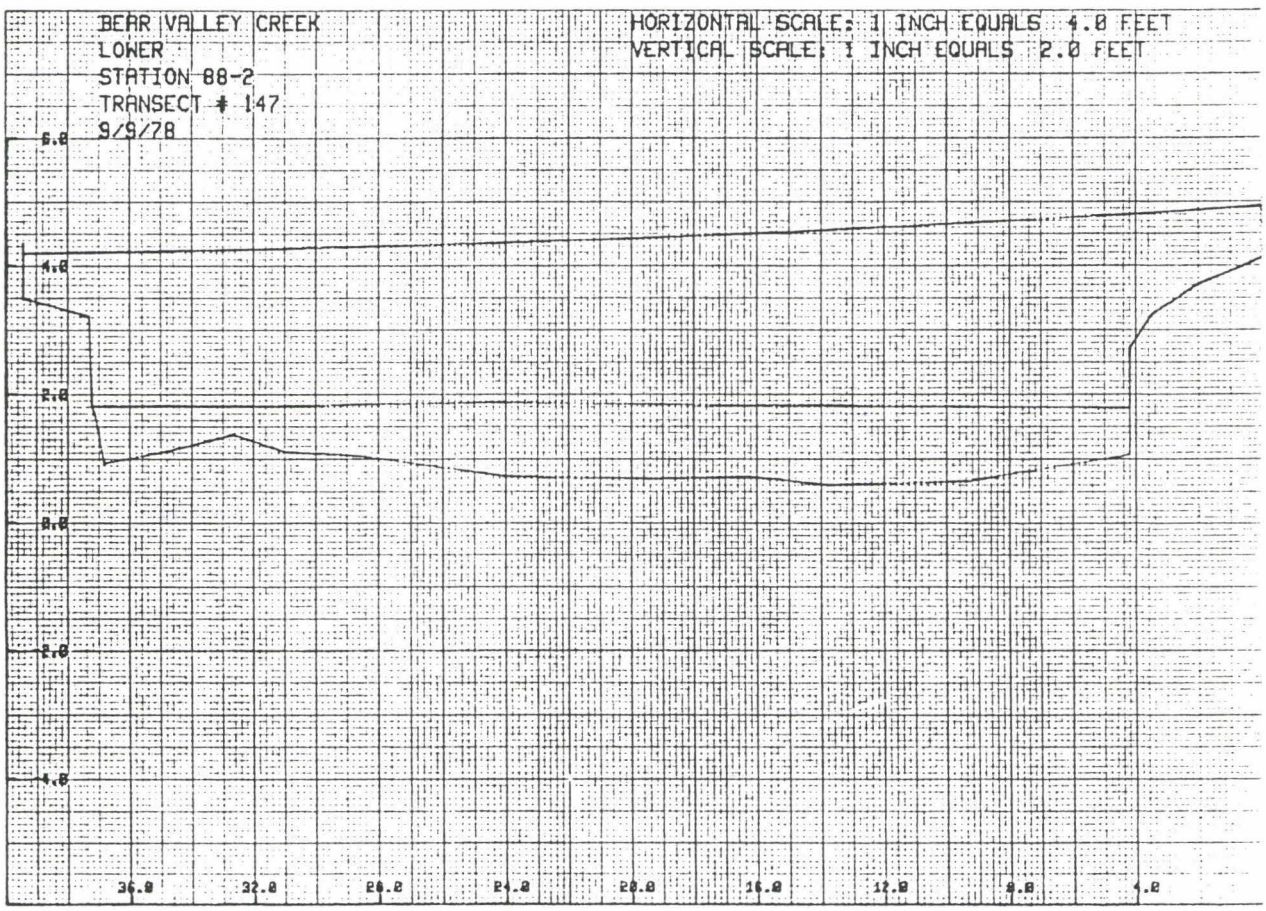

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 150
9/9/78
HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
2.0
4.0
36.0
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0

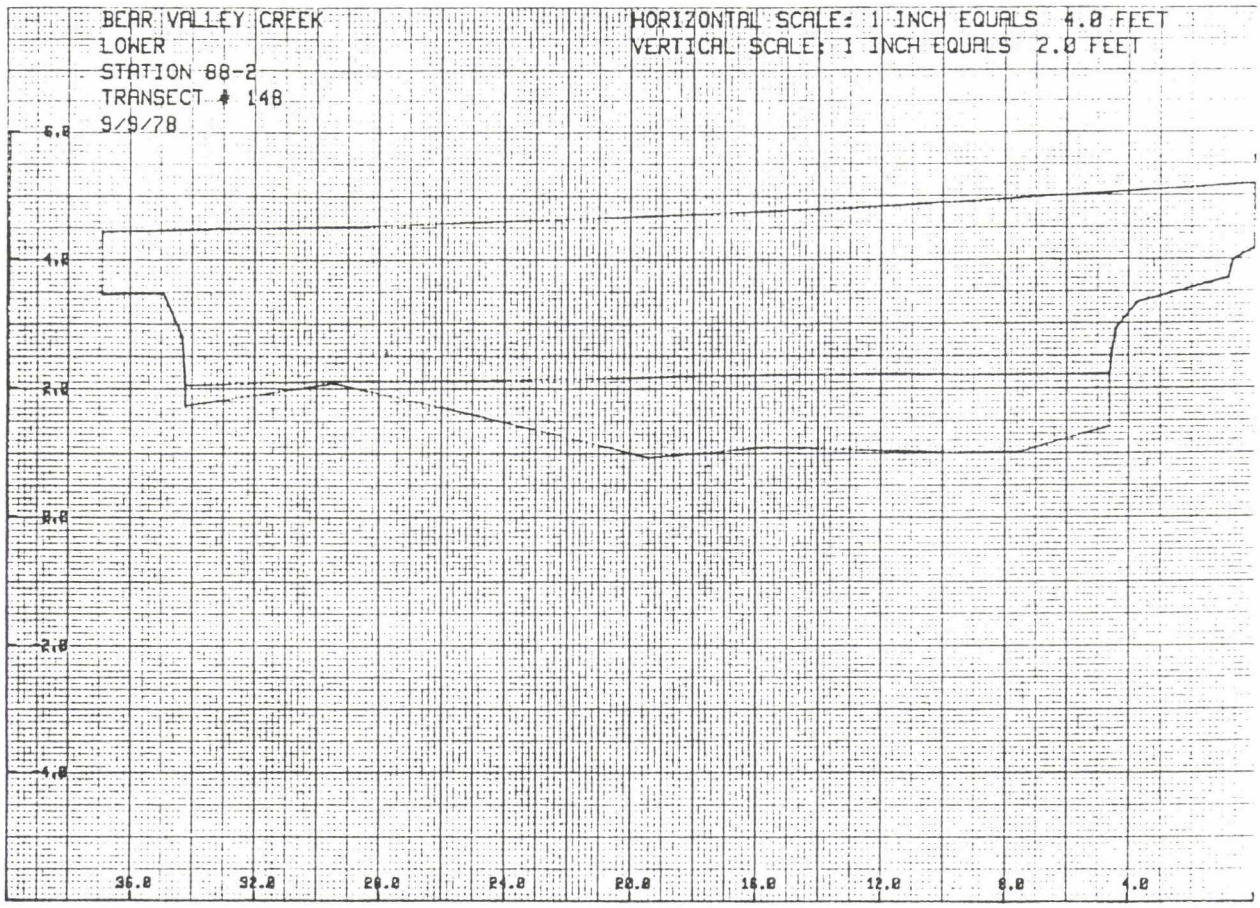

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 151
9/9/78
HORIZONTAL SCALE: 1 INCH EQUALS 4.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
2.0
4.0
40.5
36.0
31.5
27.0
22.5
18.0
13.5
9.0
4.5

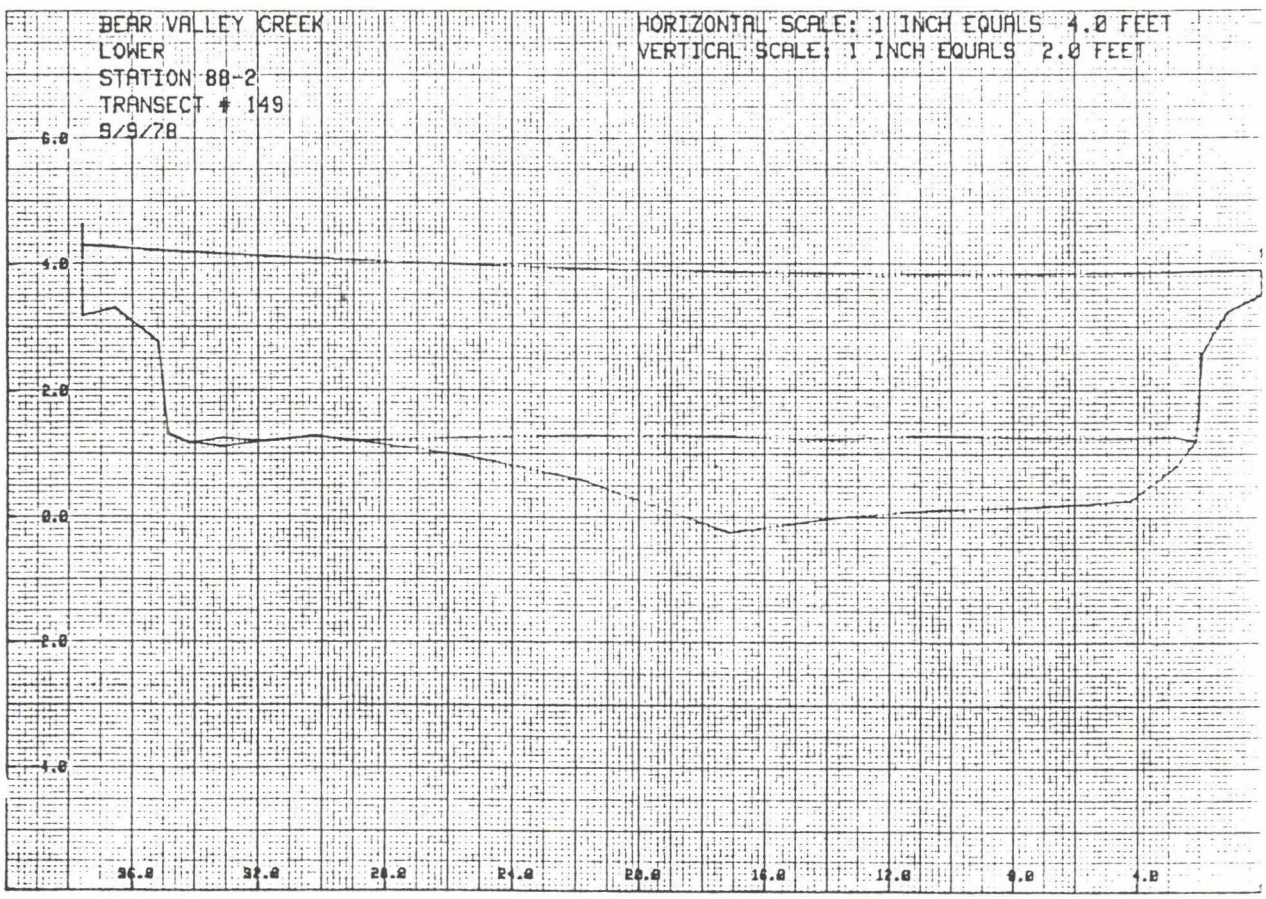

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 152
9/9/78
HORIZONTAL SCALE: 1 INCH EQUALS 4.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
40.5
36.0
31.5
27.0
22.5
18.0
13.5
9.0
4.5

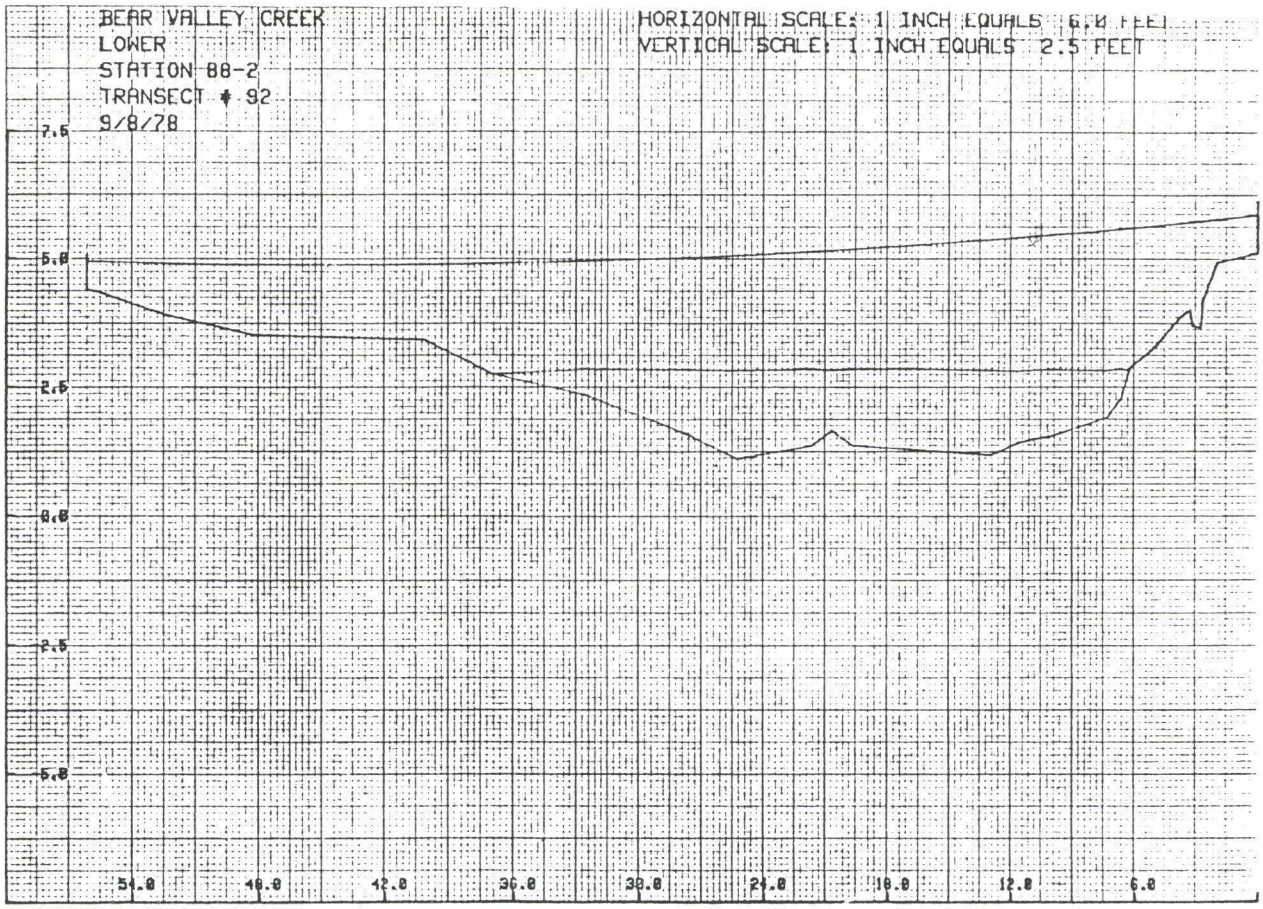

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 153
9/9/78
HORIZONTAL SCALE: 1 INCH EQUALS 4.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
40.5
36.0
31.5
27.0
22.5
18.0
13.5
9.0
4.5

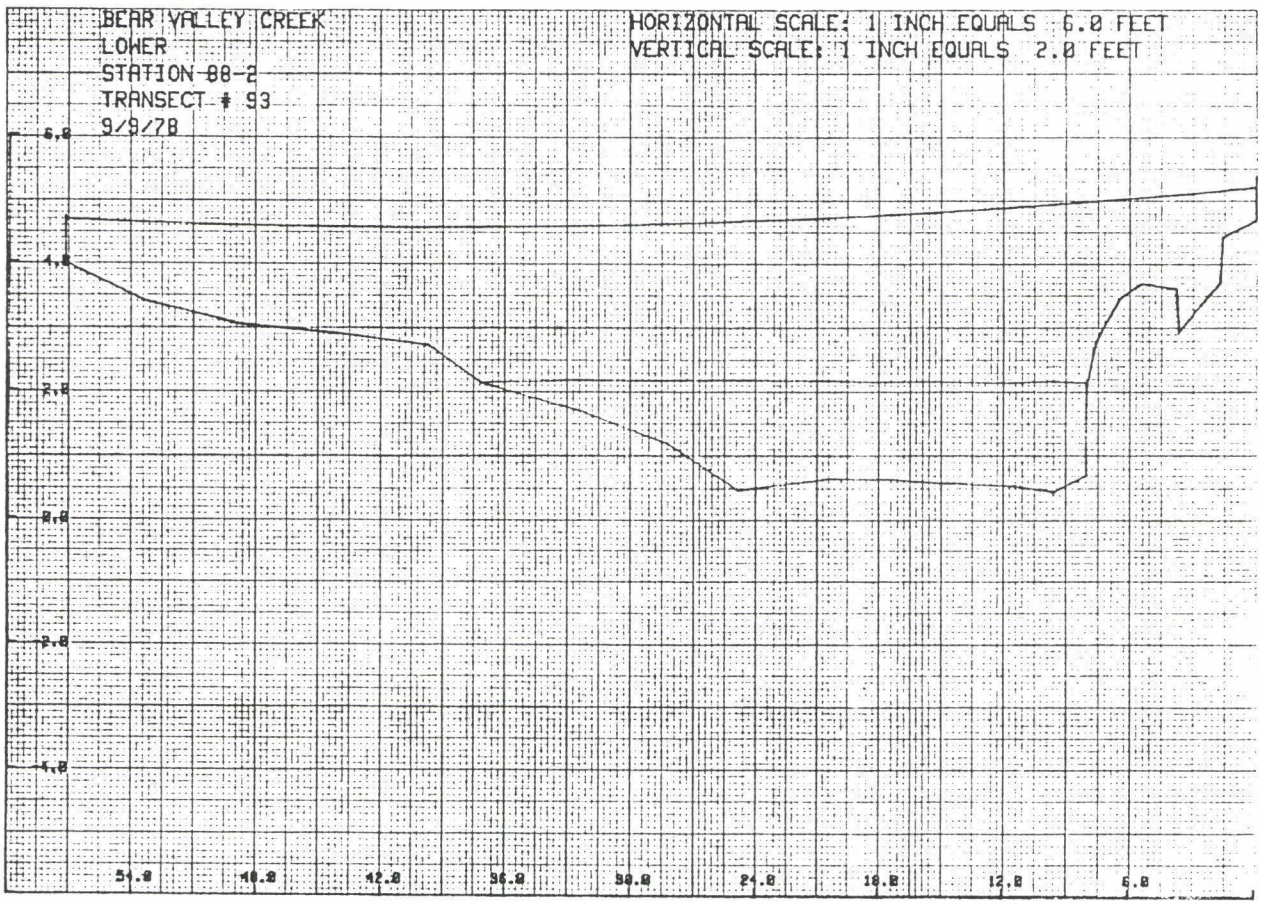

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 146
9/9/78
HORIZONTAL SCALE: 1 INCH EQUALS 4.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
2.0
4.0
40.5
36.0
31.5
27.0
22.5
18.0
13.5
9.0
4.5

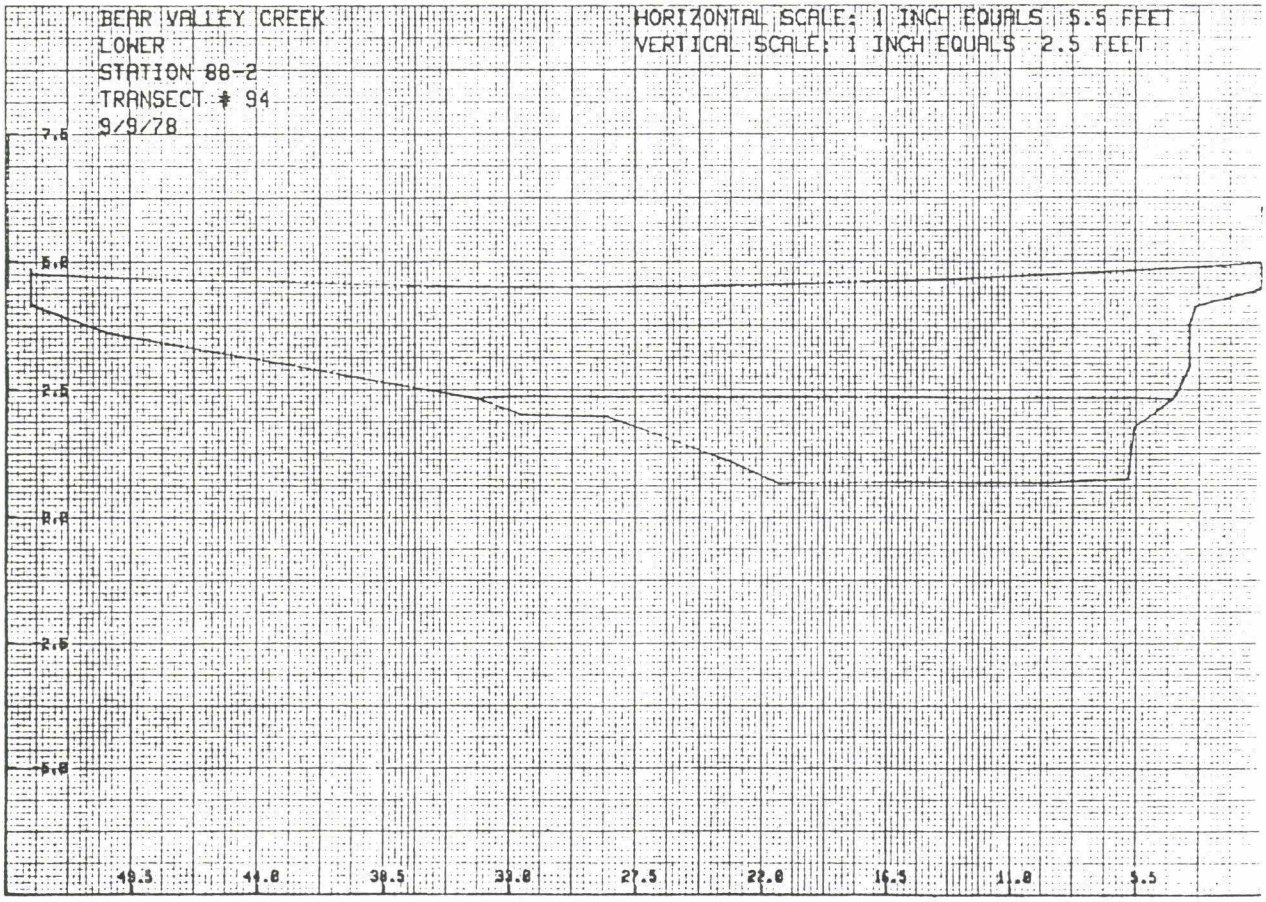

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 147
9/9/78
HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
2.0
4.0
36.0
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0

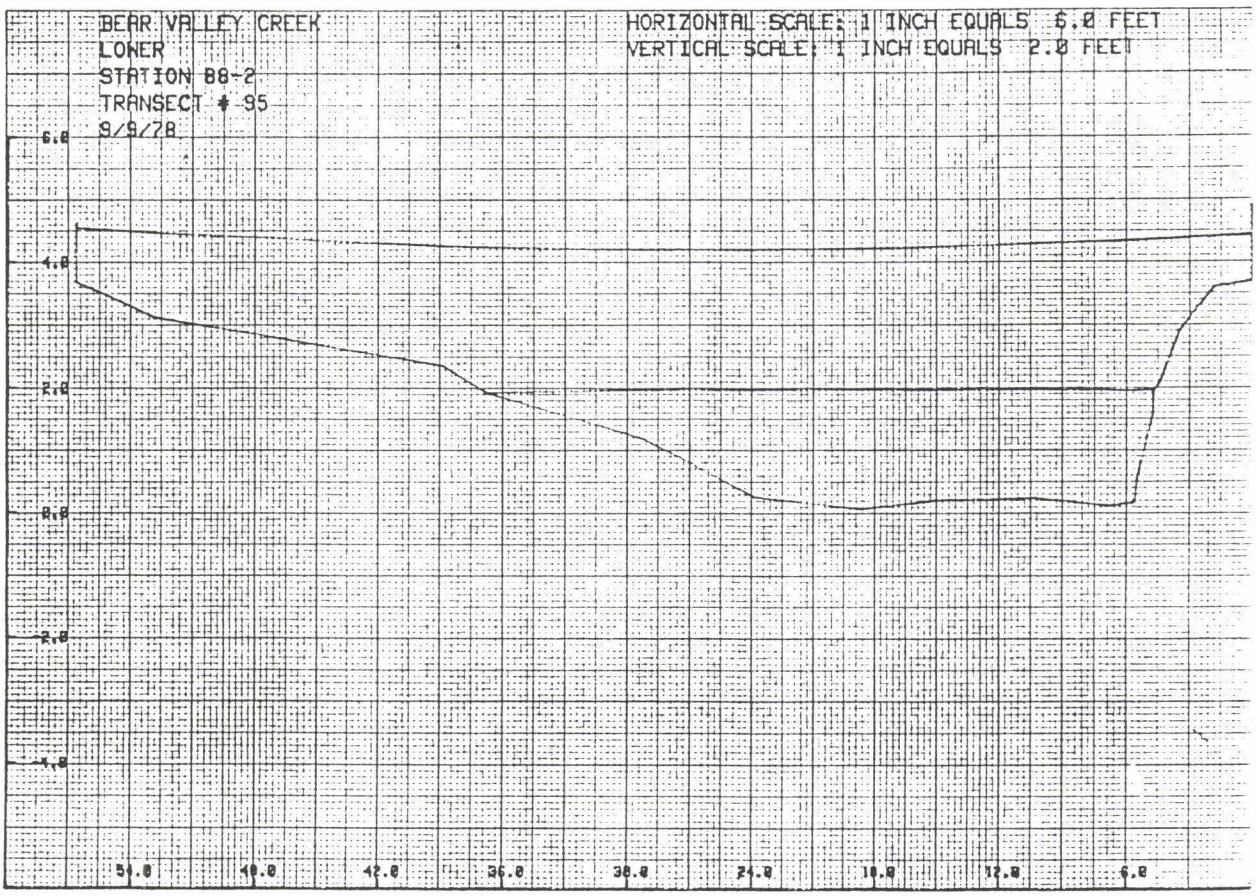

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 148
9/9/78
HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
36.0
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0

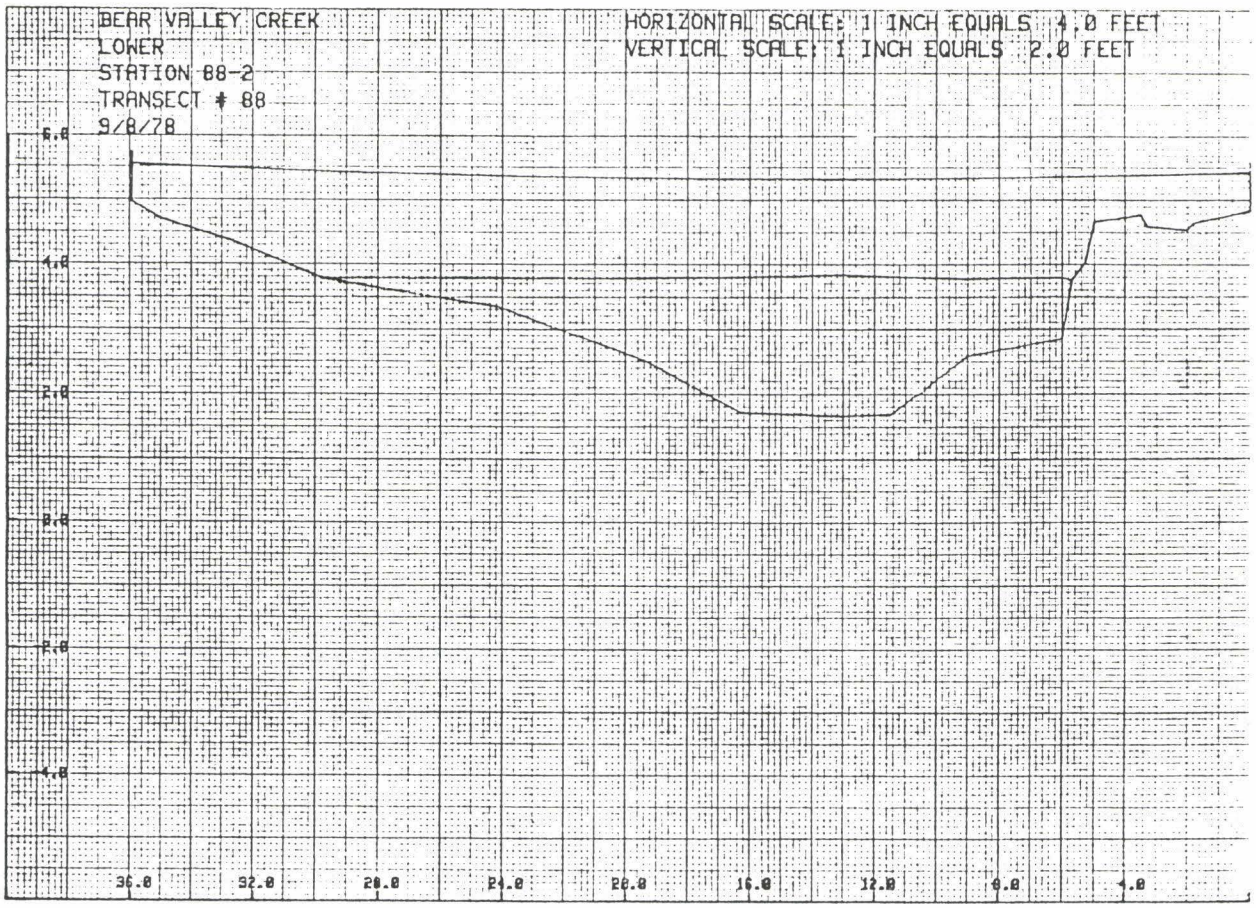

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 149
9/9/78
HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
36.0
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0

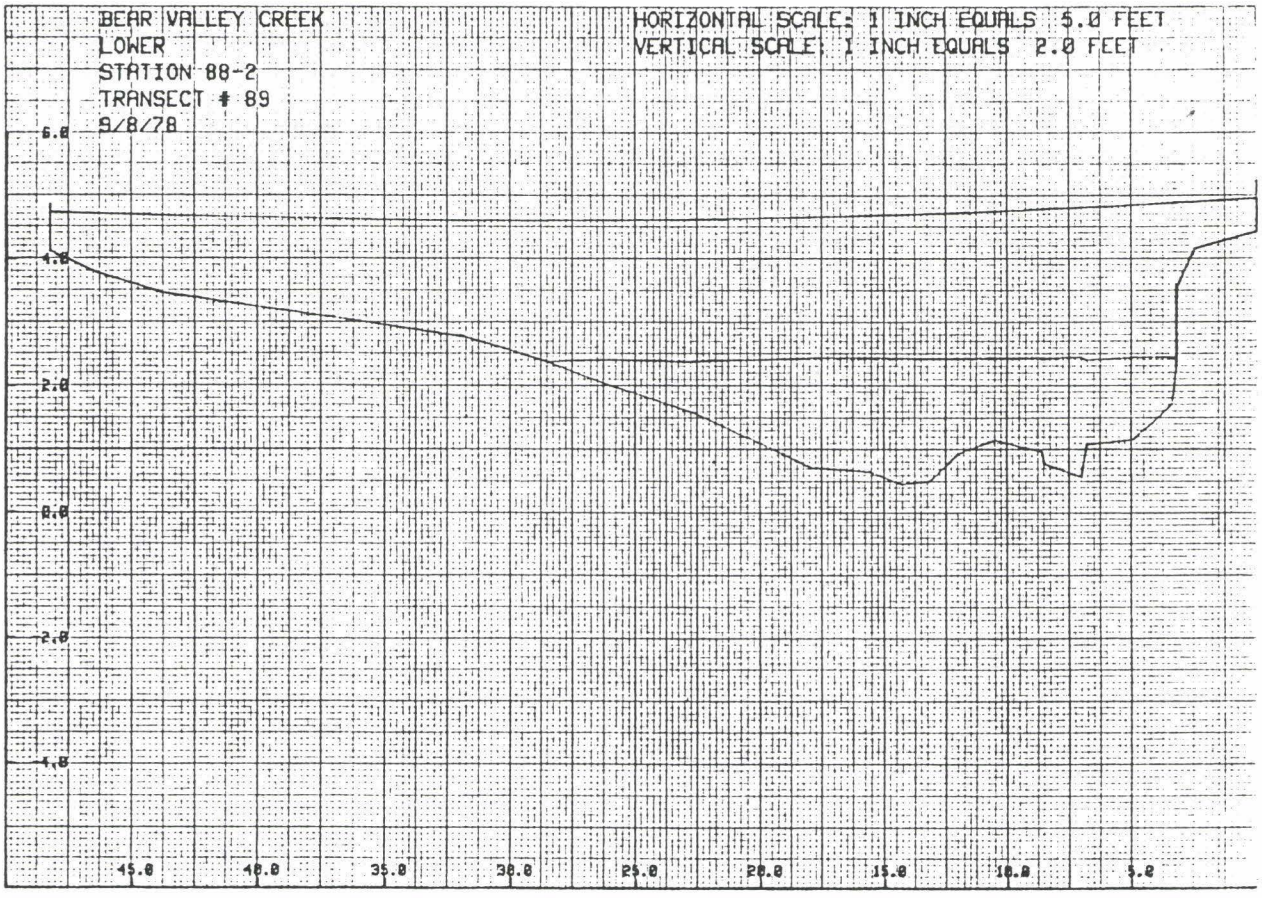

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 92
9/8/78
HORIZONTAL SCALE: 1 INCH EQUALS 6.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
54.0
48.0
42.0
36.0
30.0
24.0
18.0
12.0
6.0

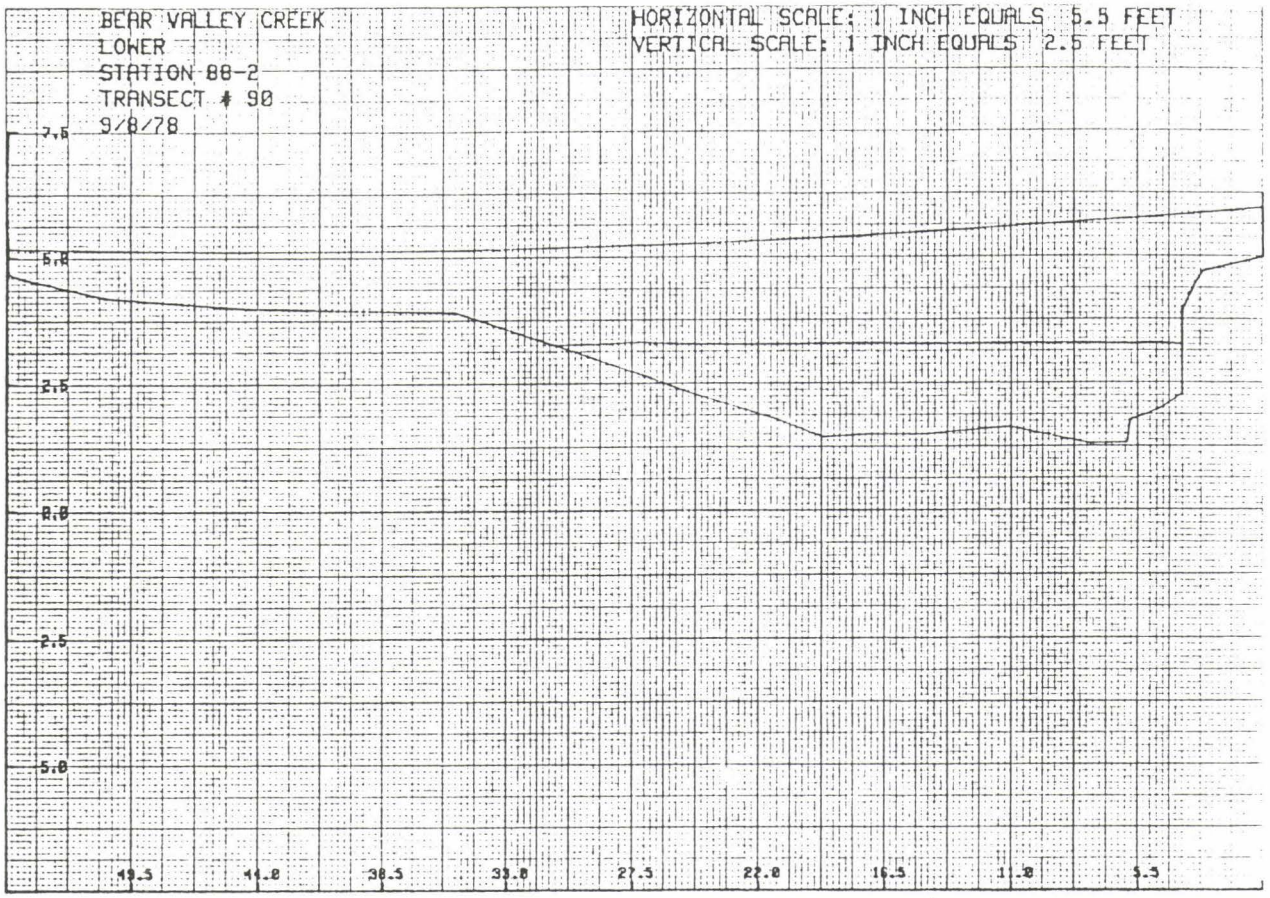

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 93
9/9/78
HORIZONTAL SCALE: 1 INCH EQUALS 6.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
54.0
48.0
42.0
36.0
30.0
24.0
18.0
12.0
6.0

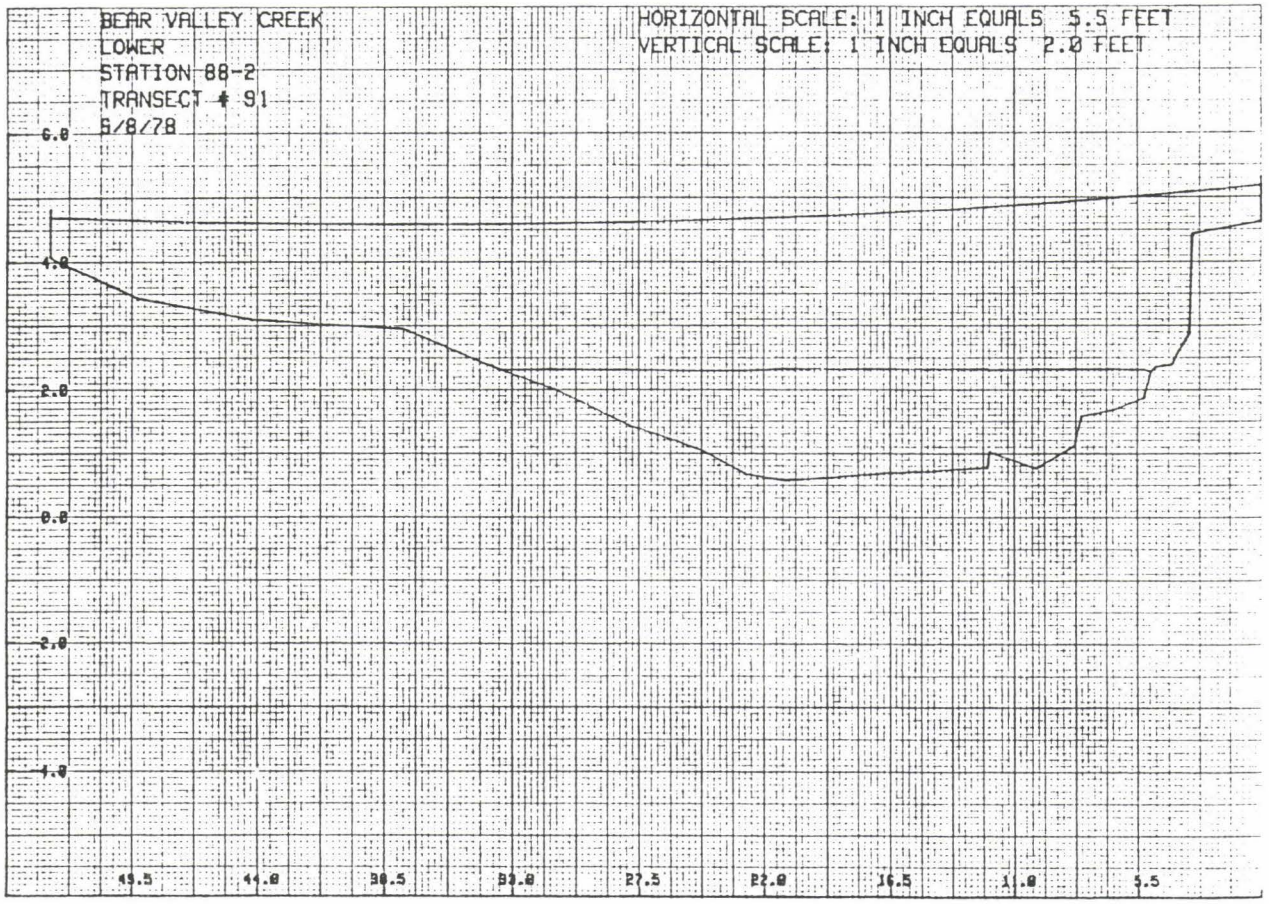

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 94
9/9/78
HORIZONTAL SCALE: 1 INCH EQUALS 5.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
49.5
44.0
38.5
33.0
27.5
22.0
16.5
11.0
5.5

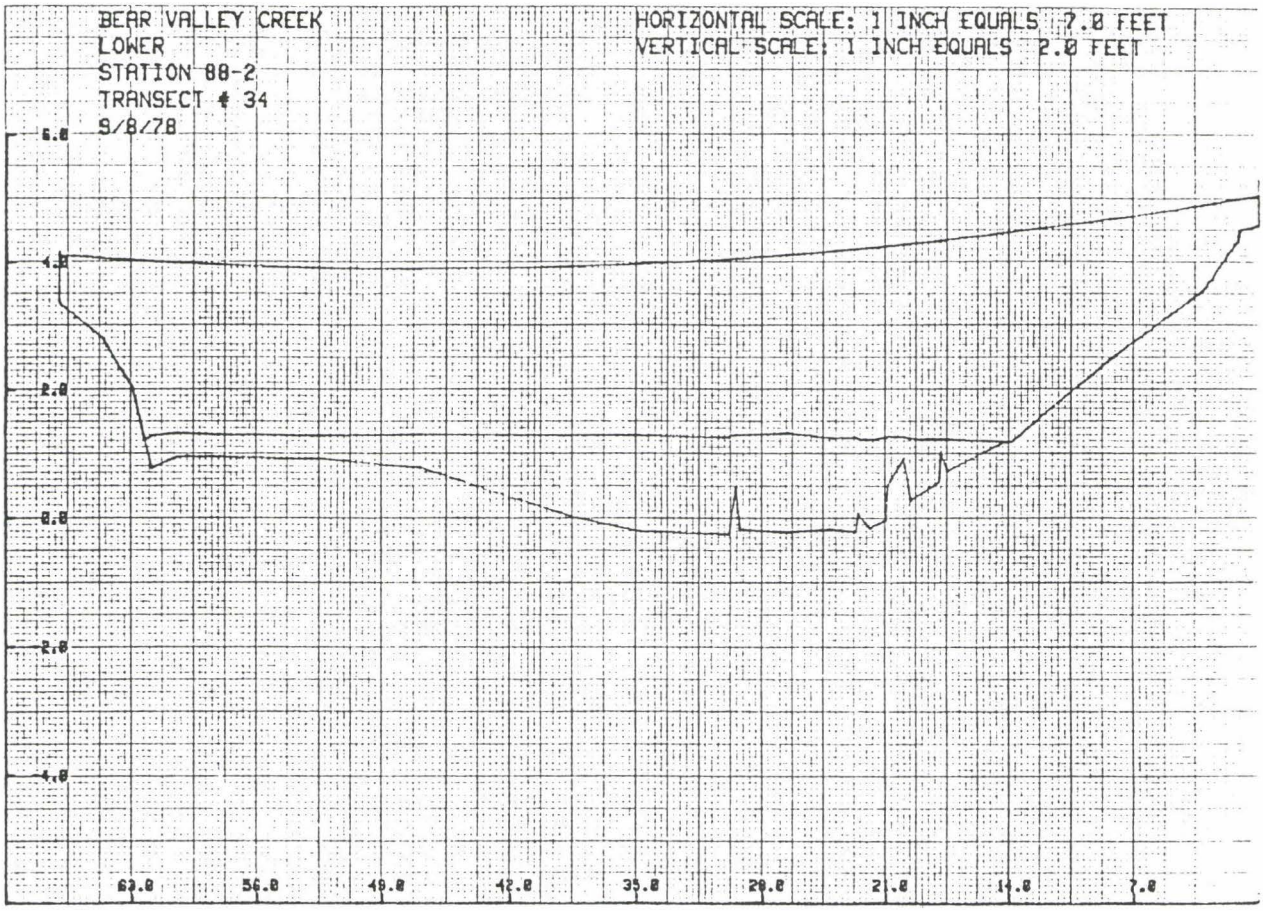

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 95
9/9/78
HORIZONTAL SCALE: 1 INCH EQUALS 6.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
54.0
48.0
42.0
36.0
30.0
24.0
18.0
12.0
6.0

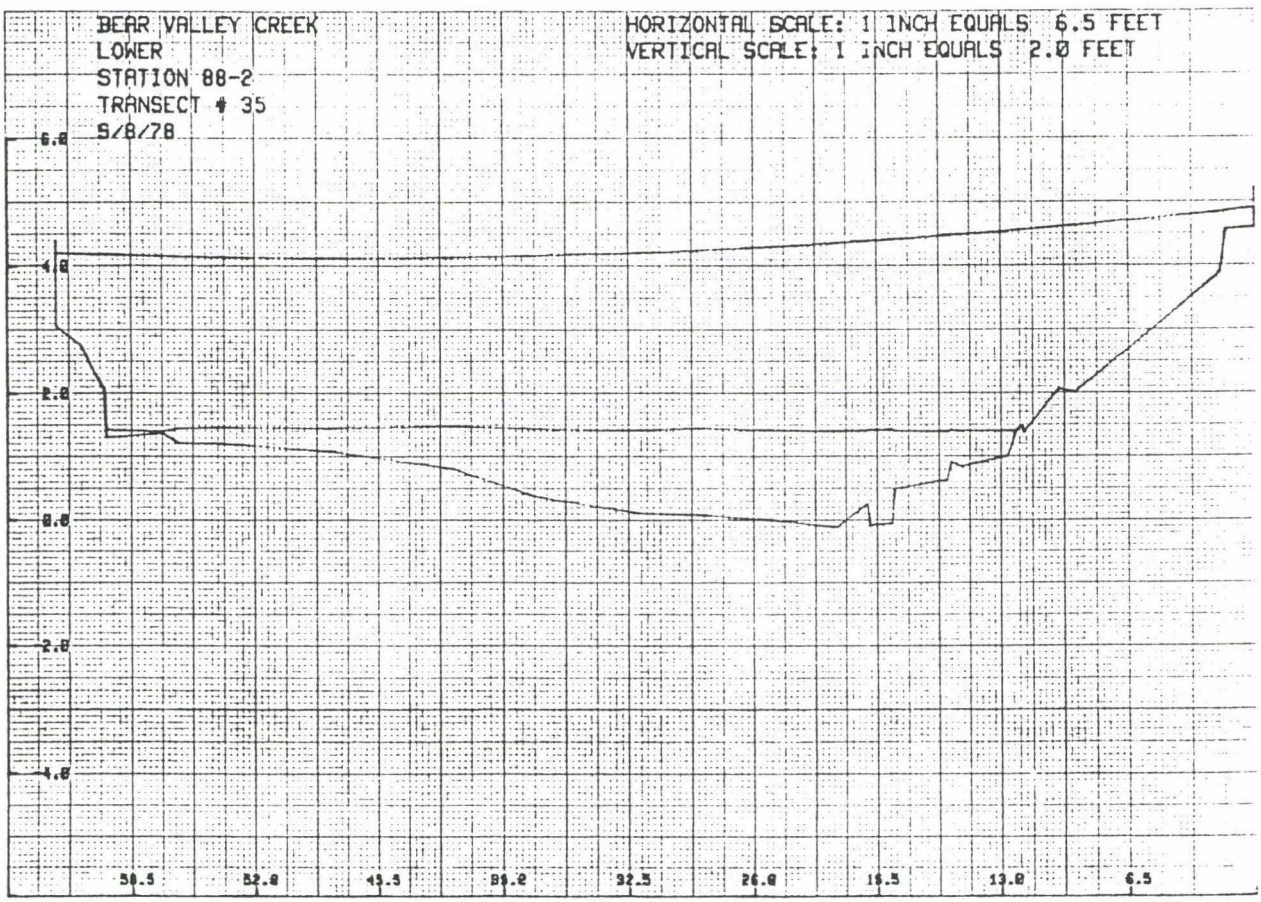

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 88
9/8/78
HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
36.0
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0

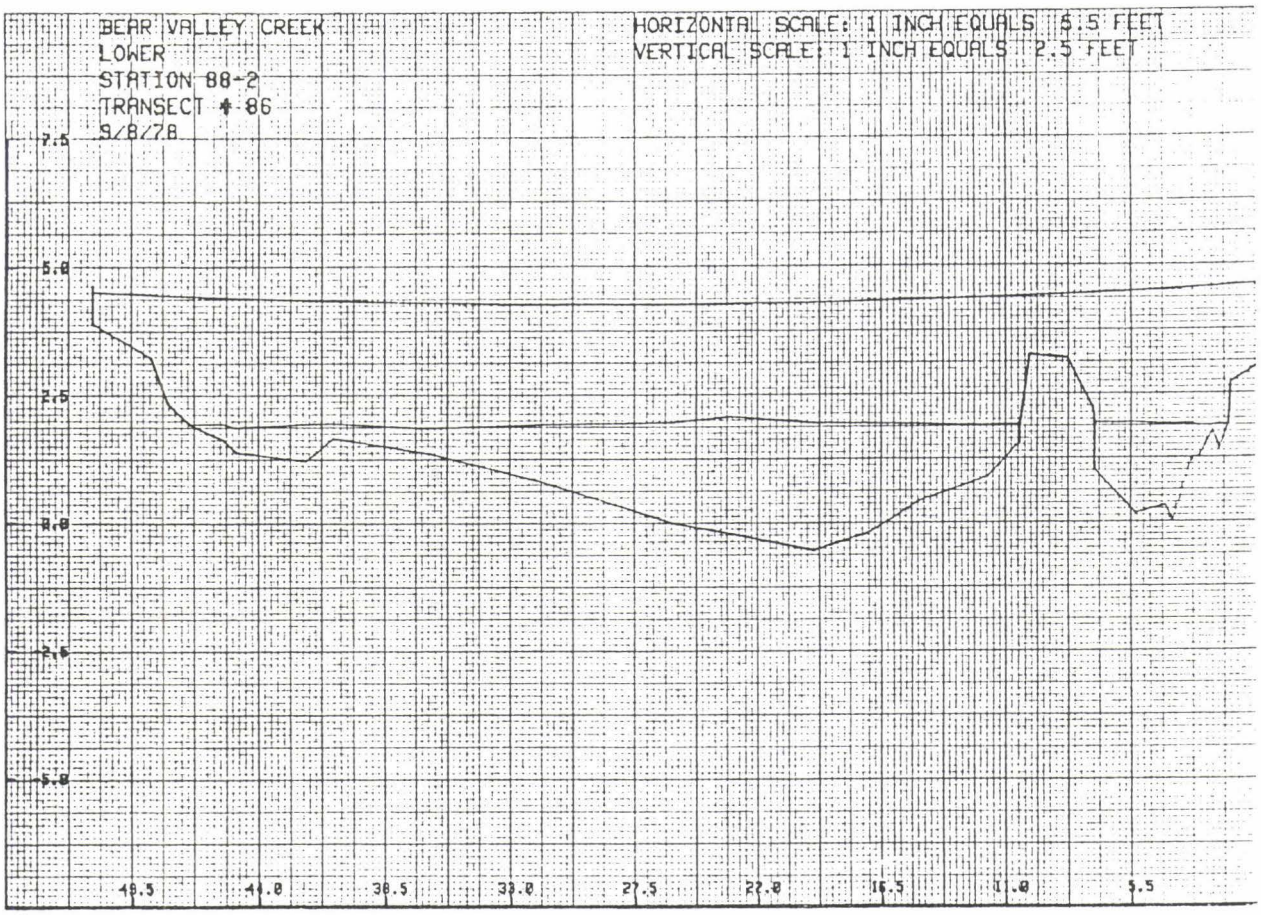

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 89
9/8/78
HORIZONTAL SCALE: 1 INCH EQUALS 5.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0

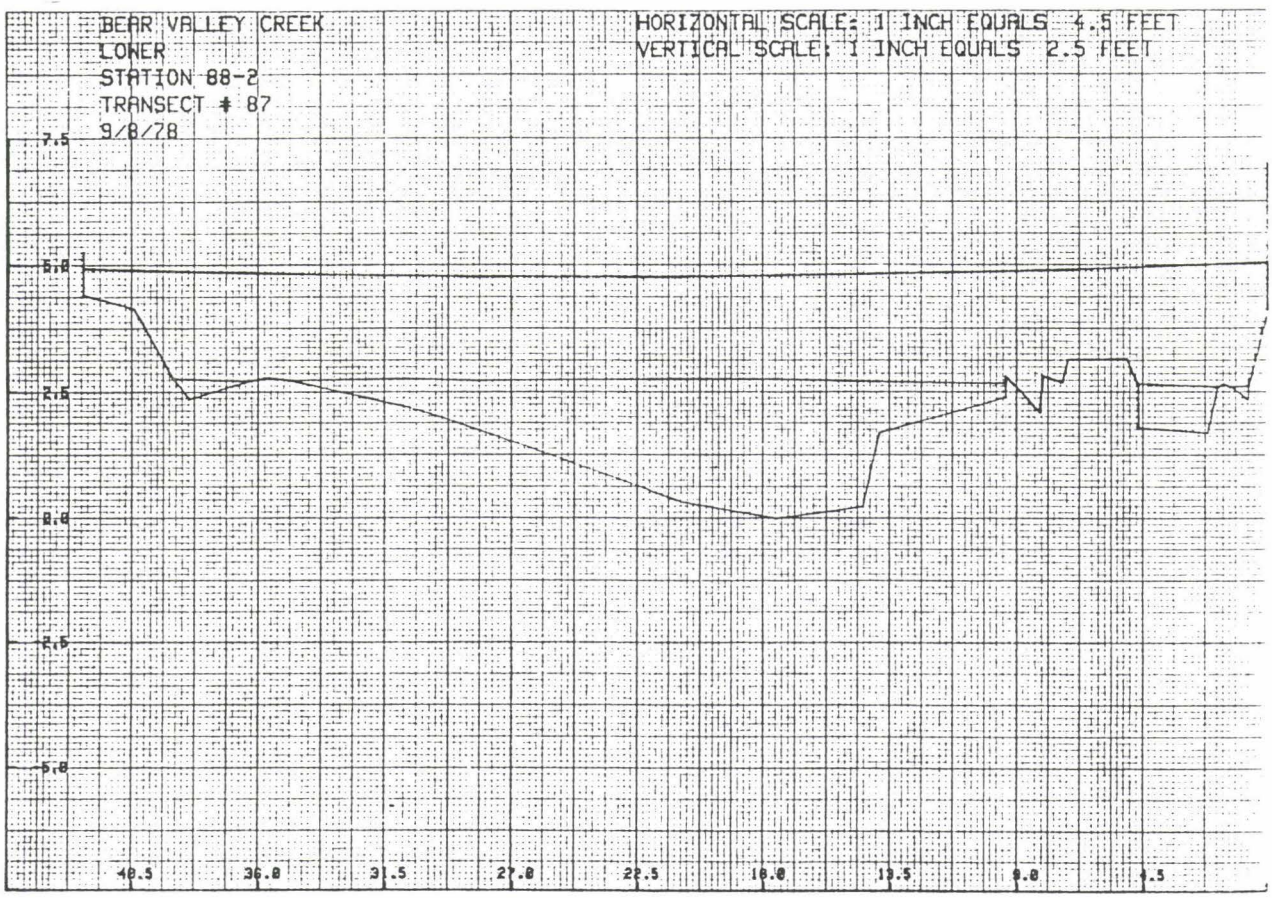

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 90
9/8/78
HORIZONTAL SCALE: 1 INCH EQUALS 5.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
2.5
5.0
49.5
44.0
38.5
33.0
27.5
22.0
16.5
11.0
5.5

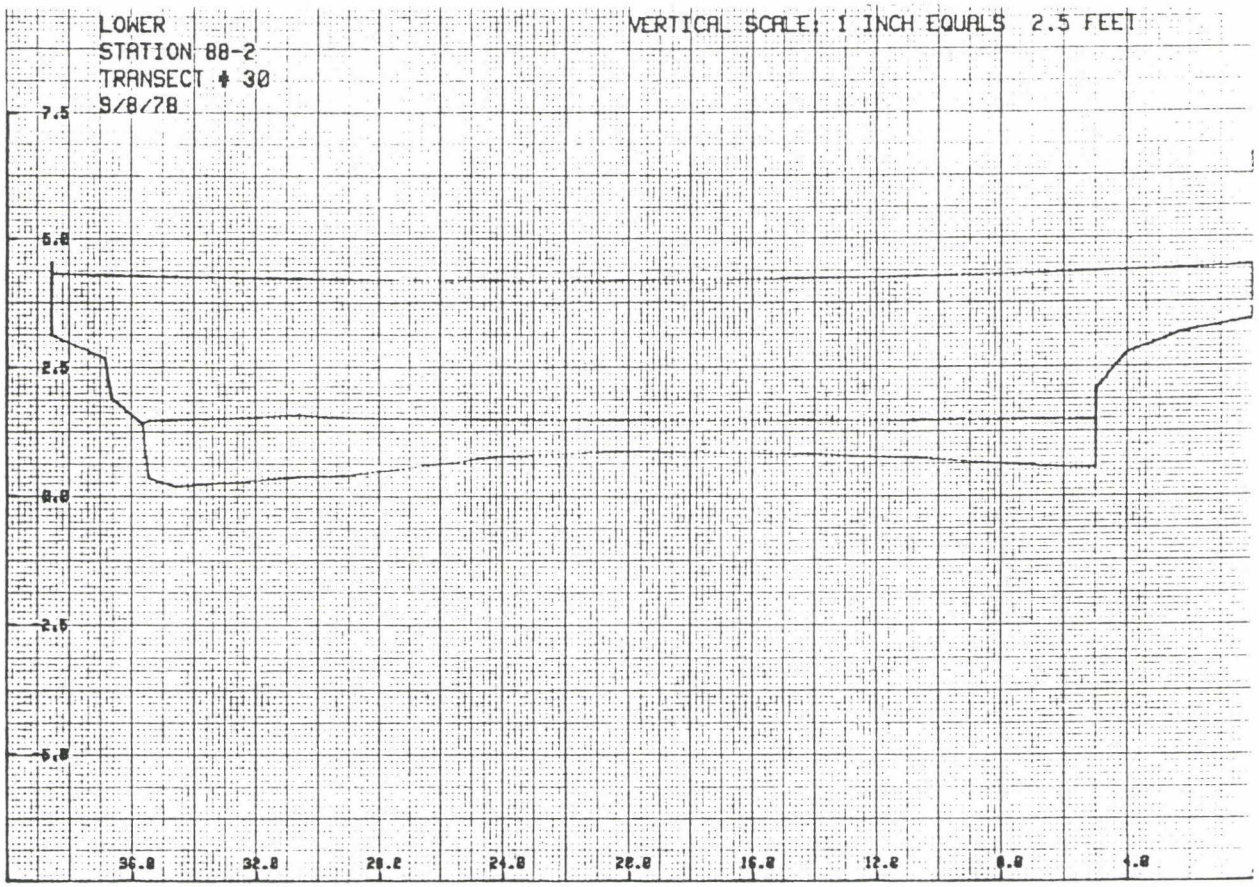

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 91
6/8/78
HORIZONTAL SCALE: 1 INCH EQUALS 5.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
49.5
44.0
38.5
33.0
27.5
22.0
16.5
11.0
5.5

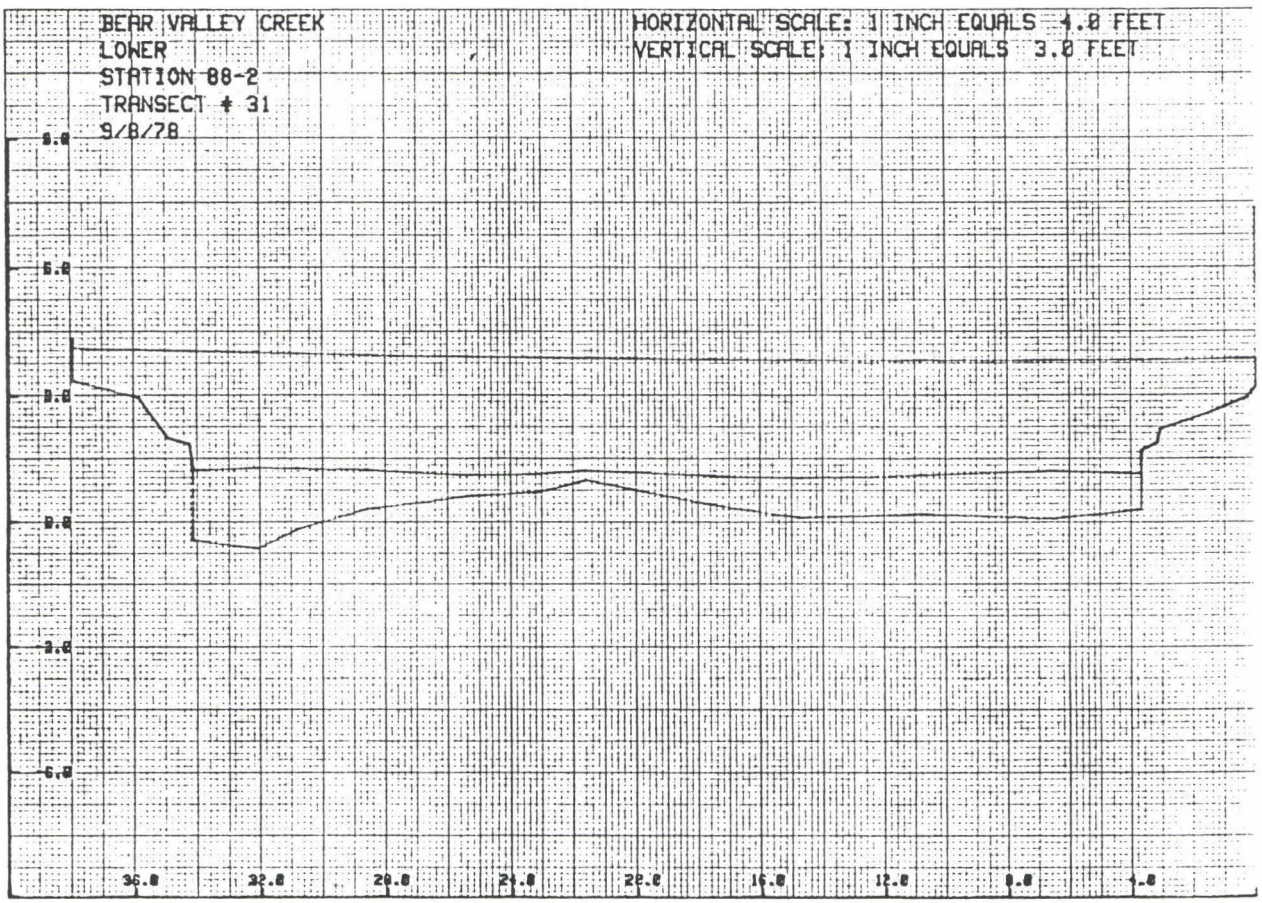

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 34
9/8/78
HORIZONTAL SCALE: 1 INCH EQUALS 7.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
63.0
56.0
49.0
42.0
35.0
28.0
21.0
14.0
7.0

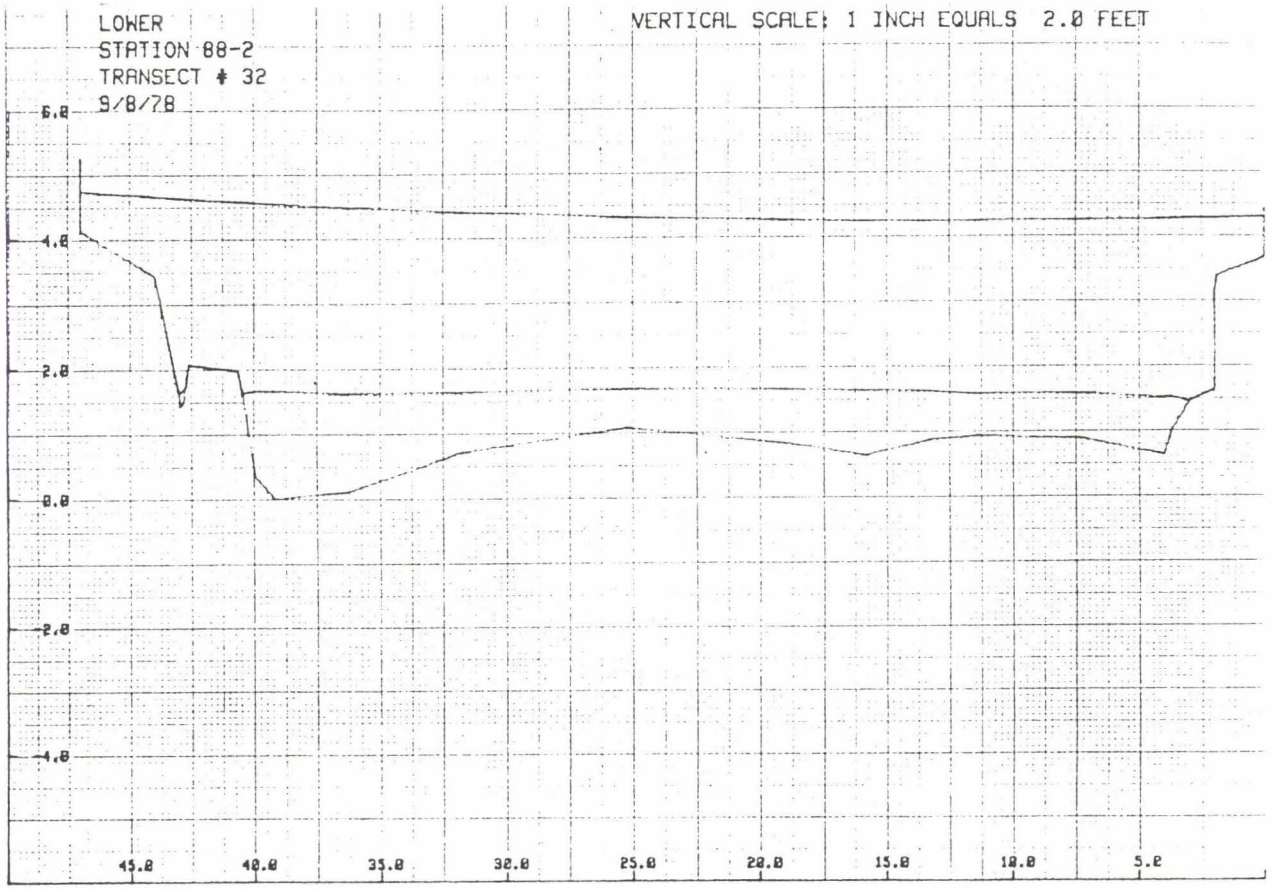

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 35
9/8/78
HORIZONTAL SCALE: 1 INCH EQUALS 6.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
58.5
52.0
45.5
39.0
32.5
26.0
19.5
13.0
6.5

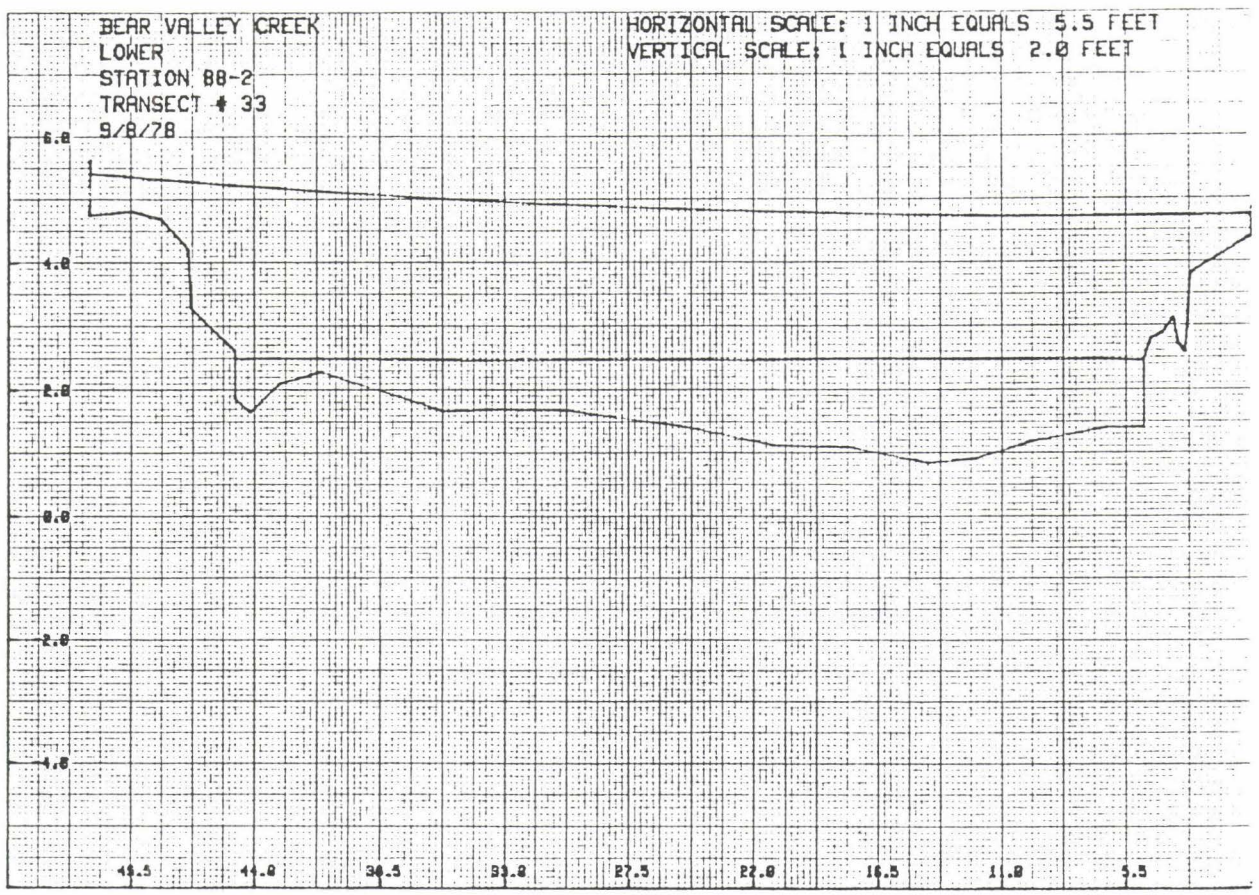

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 86
9/8/78
HORIZONTAL SCALE: 1 INCH EQUALS 5.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
49.5
44.0
38.5
33.0
27.5
22.0
16.5
11.0
5.5

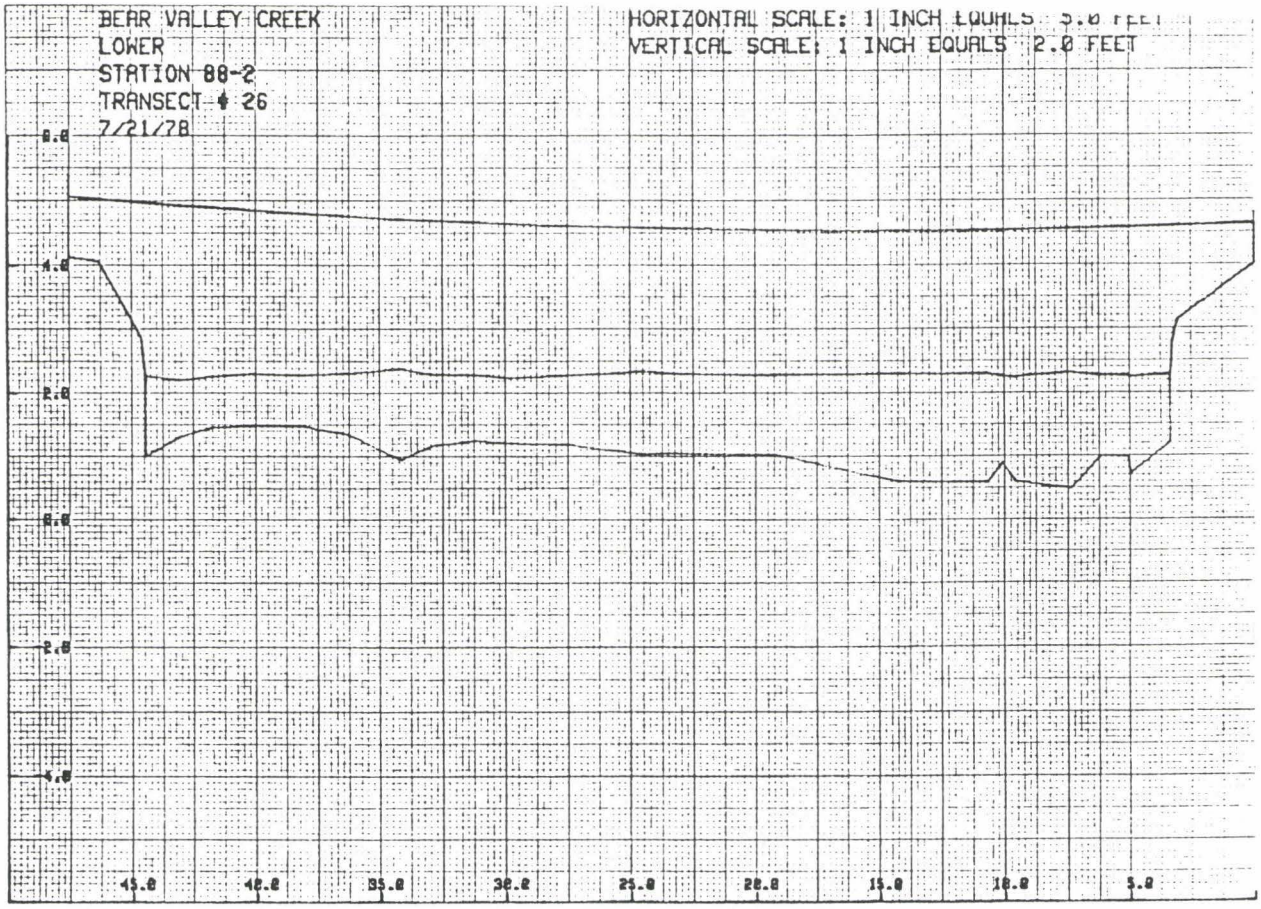

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 87
9/8/78
HORIZONTAL SCALE: 1 INCH EQUALS 4.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
40.5
36.0
31.5
27.0
22.5
18.0
13.5
9.0
4.5

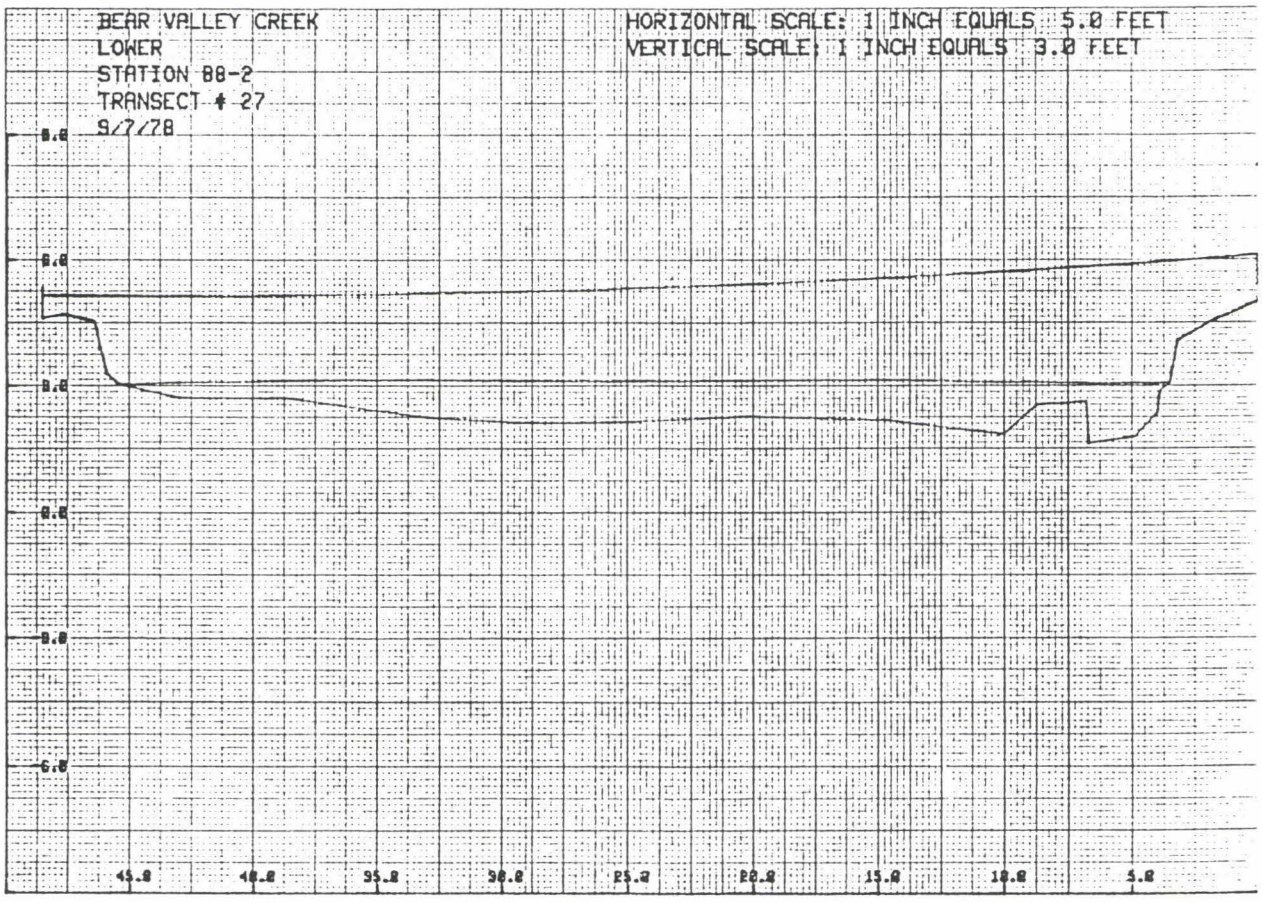

LOWER
STATION 88-2
TRANSECT # 30
9/8/78
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
36.0
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0

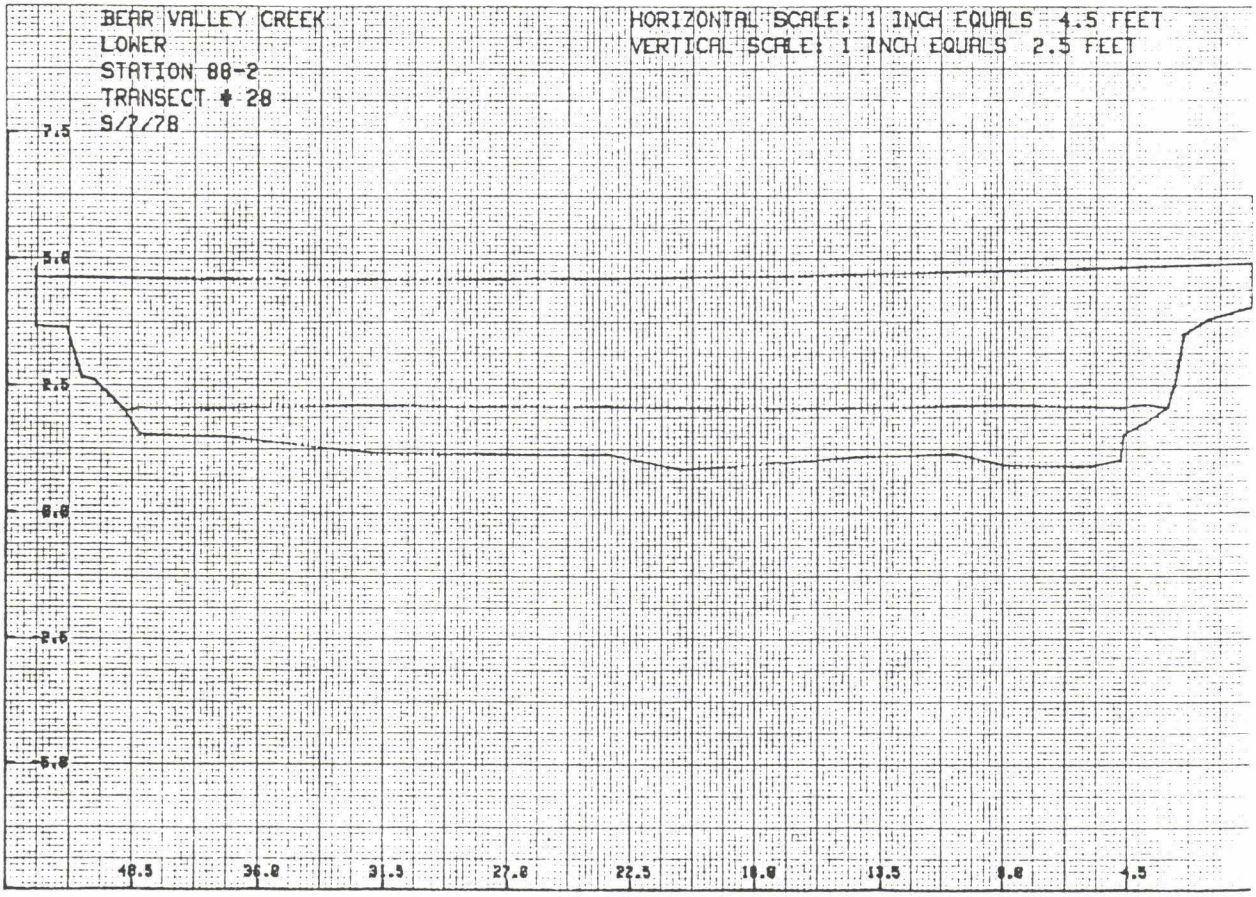

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 31
9/8/78
HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 3.0 FEET
6.0
3.0
0.0
-3.0
-6.0
36.0
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0

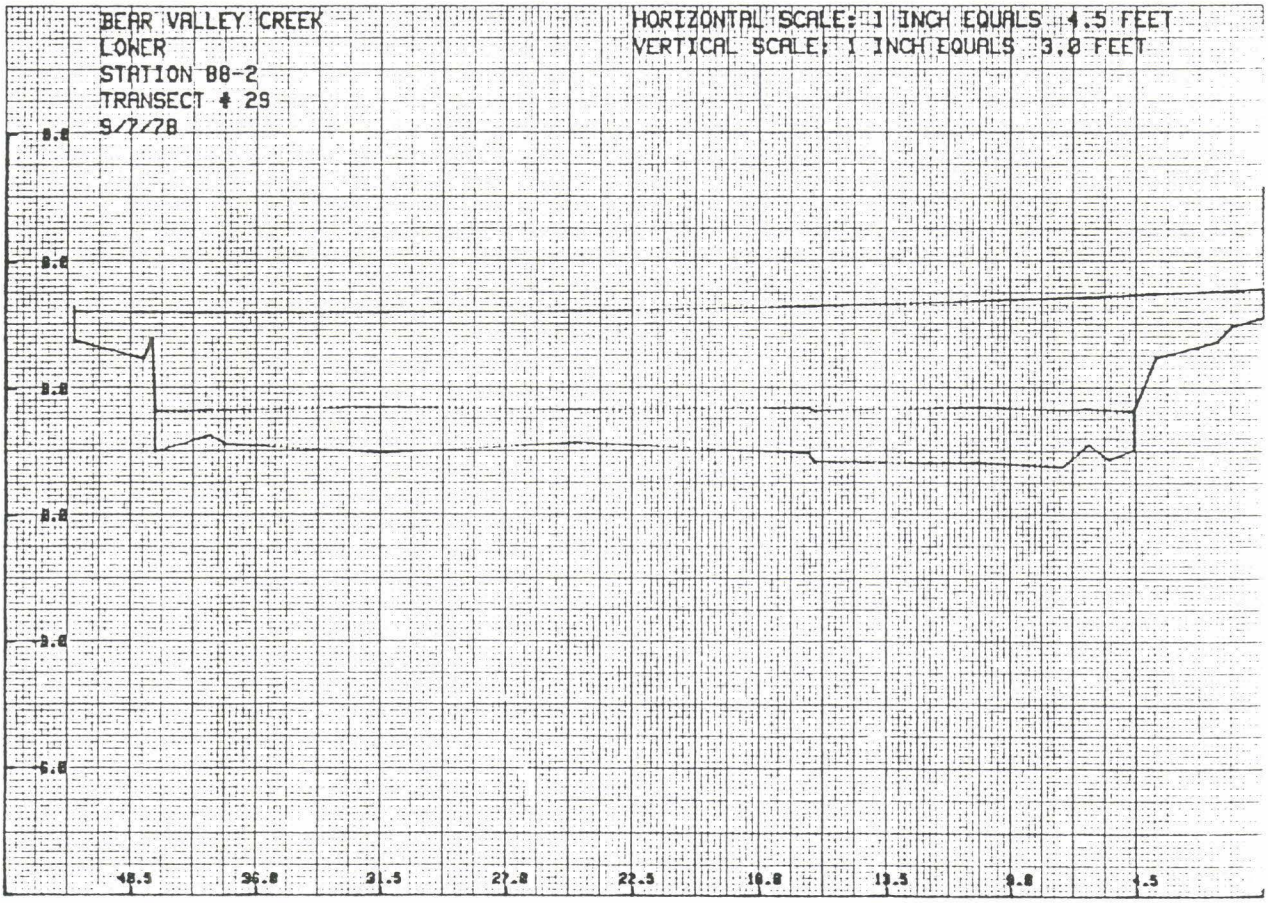

LOWER
STATION 88-2
TRANSECT # 32
9/8/78
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0

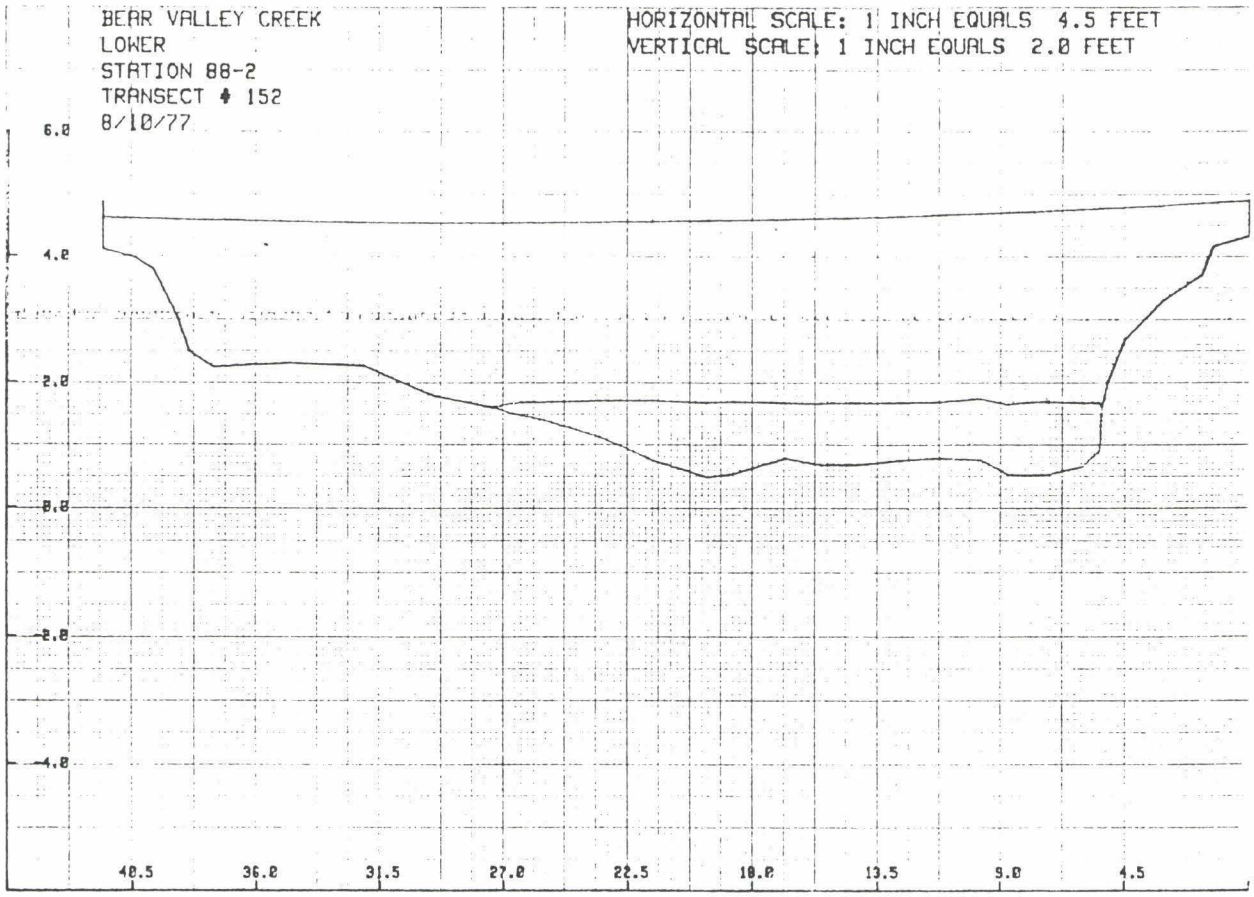

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 33
9/8/78
HORIZONTAL SCALE: 1 INCH EQUALS 5.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
49.5
44.0
38.5
33.0
27.5
22.0
16.5
11.0
5.5

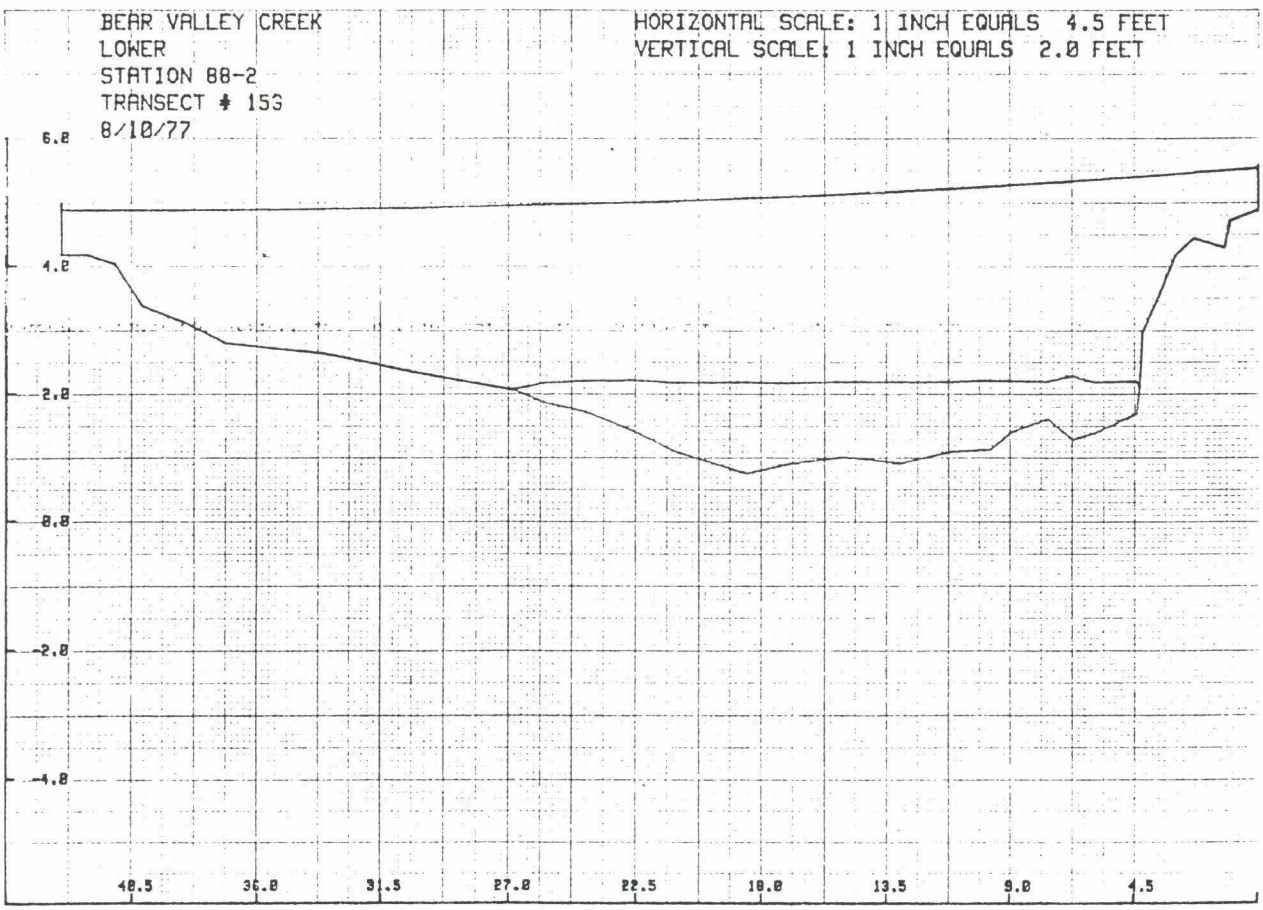

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 26
7/21/78
HORIZONTAL SCALE: 1 INCH EQUALS 5.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
8.0
4.0
2.0
0.0
-2.0
-4.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0


BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 27
9/7/78
HORIZONTAL SCALE: 1 INCH EQUALS 5.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 3.0 FEET
8.0
6.0
4.0
2.0
0.0
-2.0
-4.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0


BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 28
9/7/78
HORIZONTAL SCALE: 1 INCH EQUALS 4.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
48.5
36.0
31.5
27.0
22.5
18.0
13.5
9.0
4.5

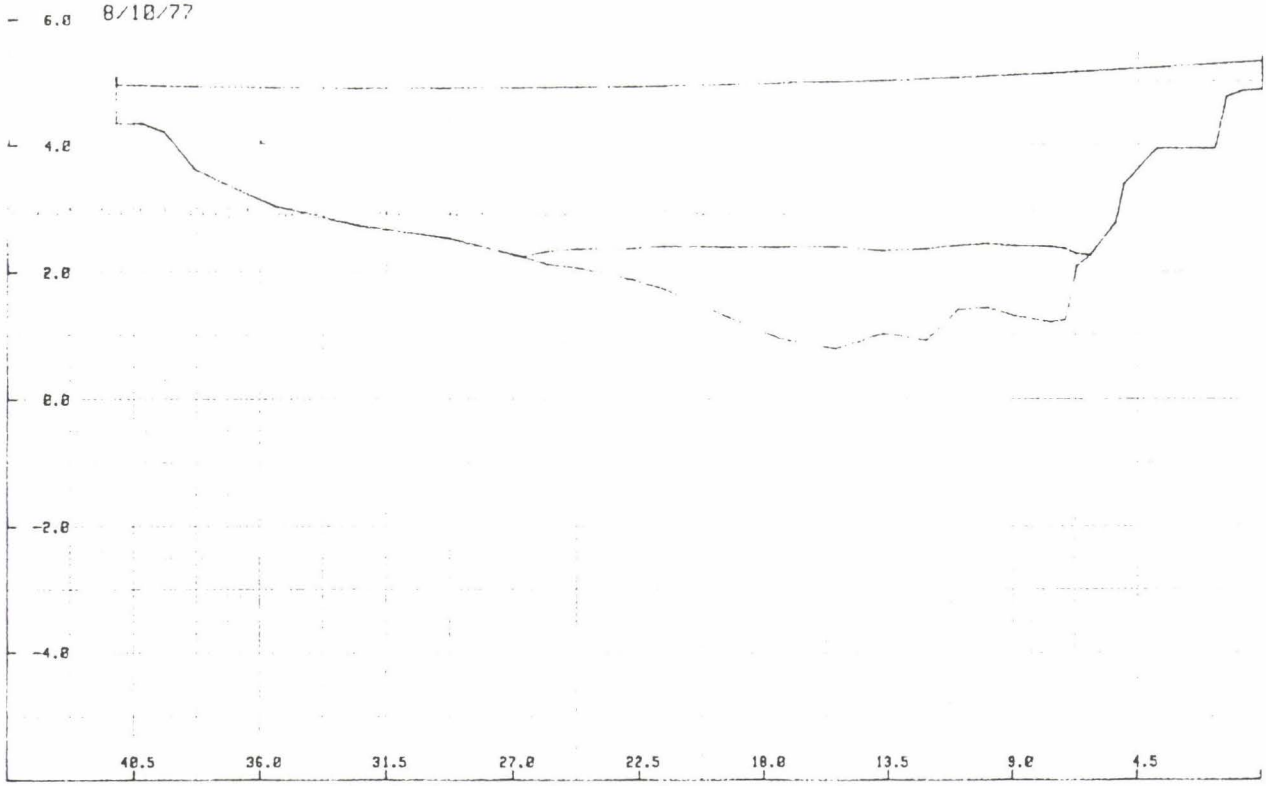

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 29
9/7/78
HORIZONTAL SCALE: 1 INCH EQUALS 4.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 3.0 FEET
6.0
3.0
0.0
-3.0
-6.0
48.5
36.0
31.5
27.0
22.5
18.0
13.5
9.0
4.5


BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 152
8/10/77
HORIZONTAL SCALE: 1 INCH EQUALS 4.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
40.5
36.0
31.5
27.0
22.5
18.0
13.5
9.0
4.5


BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 153
8/10/77
HORIZONTAL SCALE: 1 INCH EQUALS 4.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
40.5
36.0
31.5
27.0
22.5
18.0
13.5
9.0
4.5

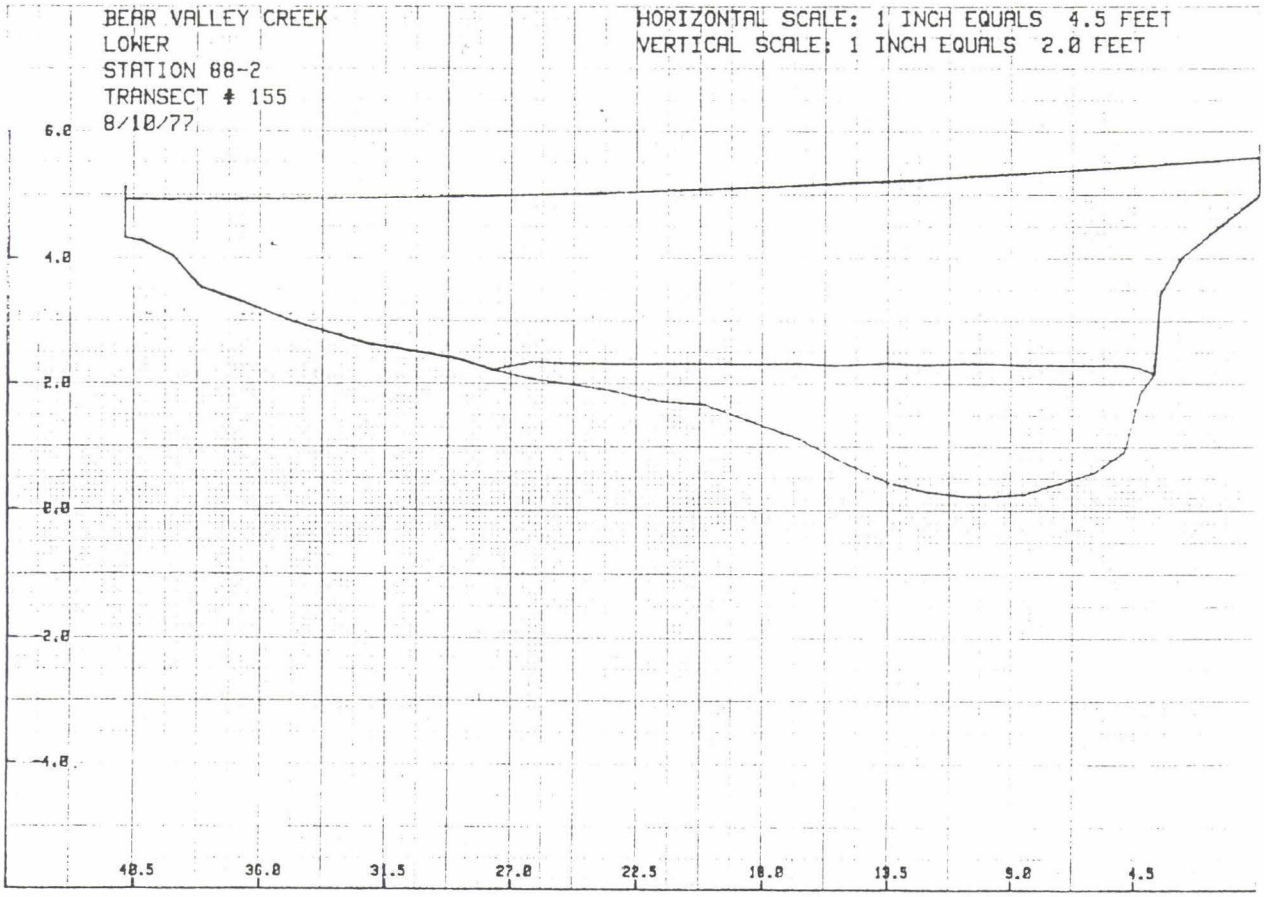
BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 154
8/10/77

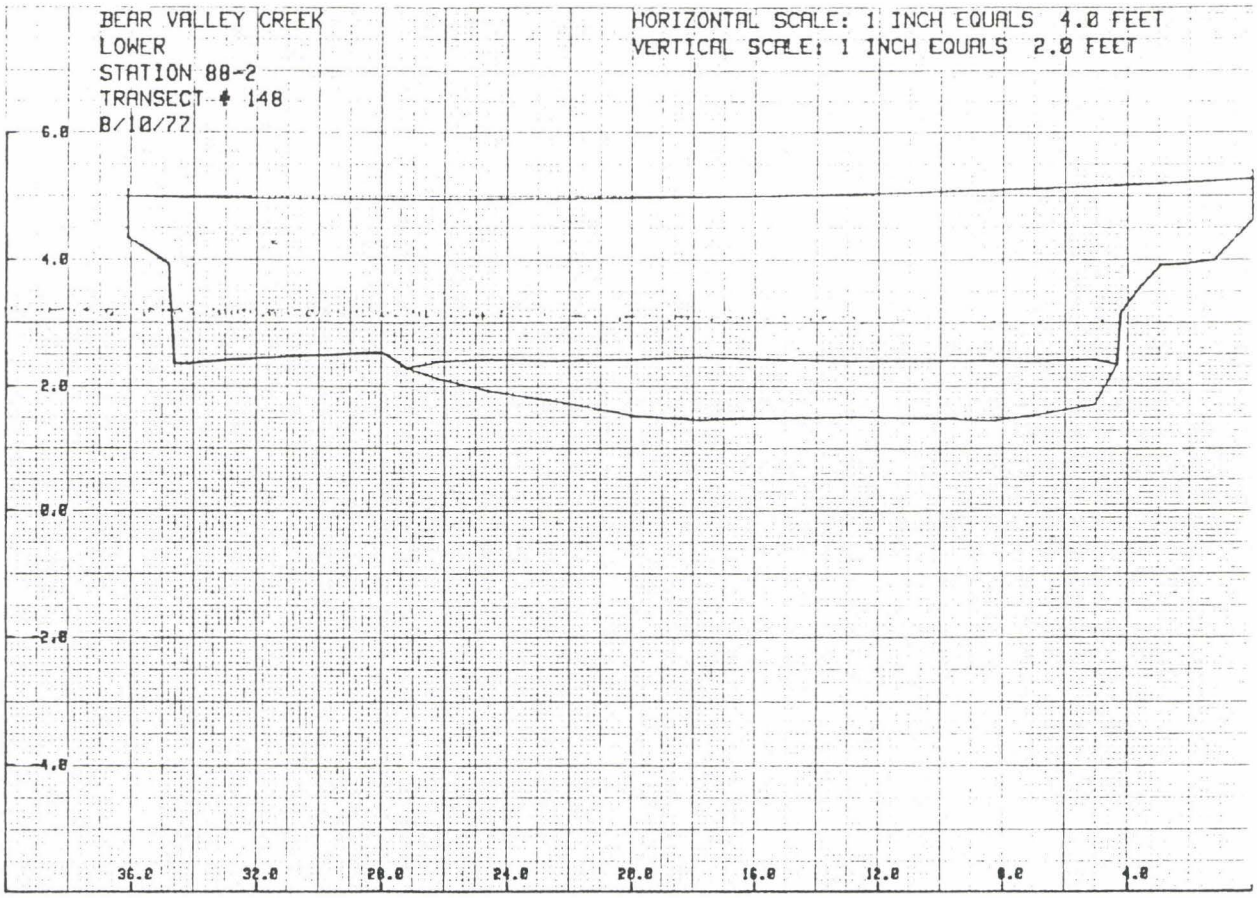
HORIZONTAL SCALE: 1 INCH EQUALS 4.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET

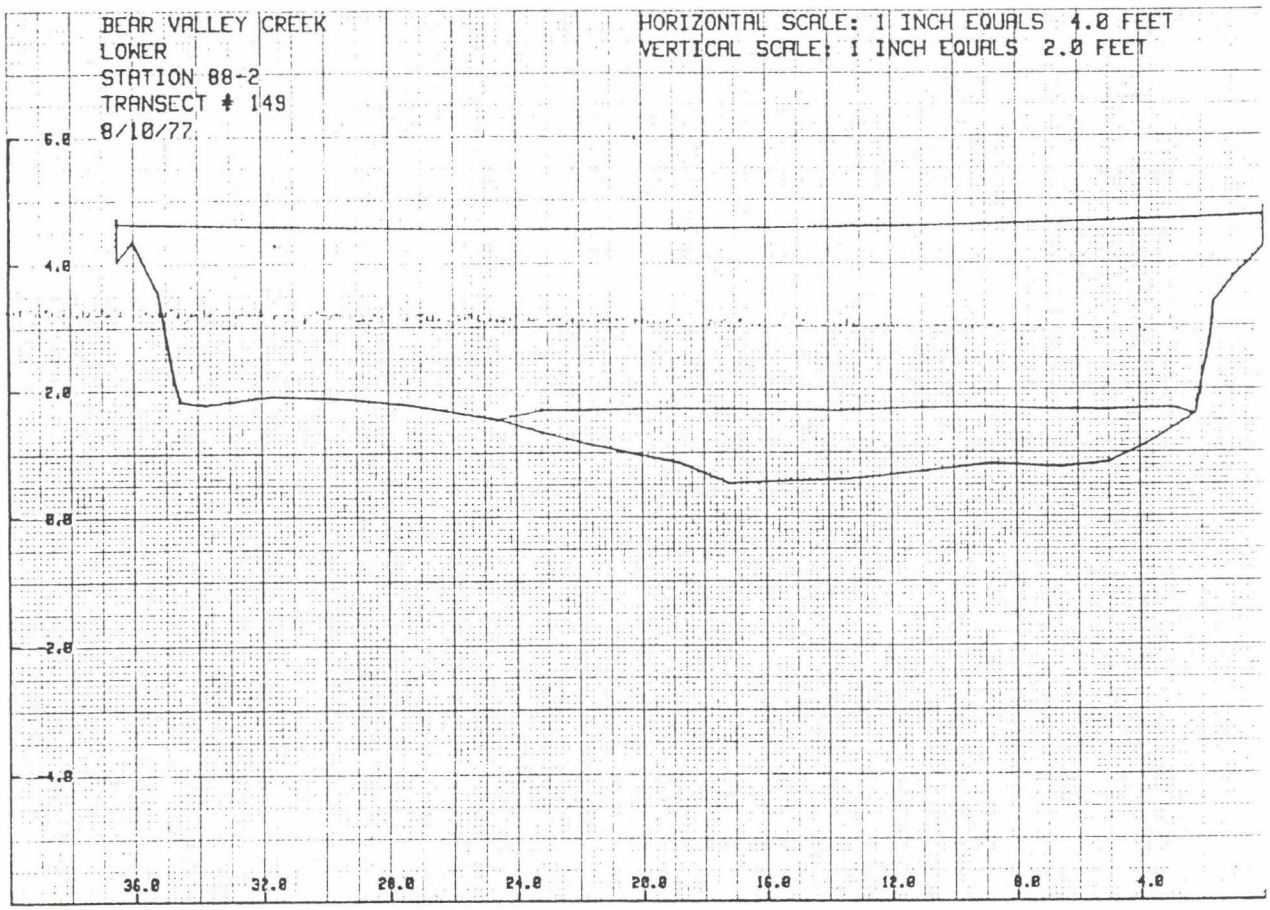


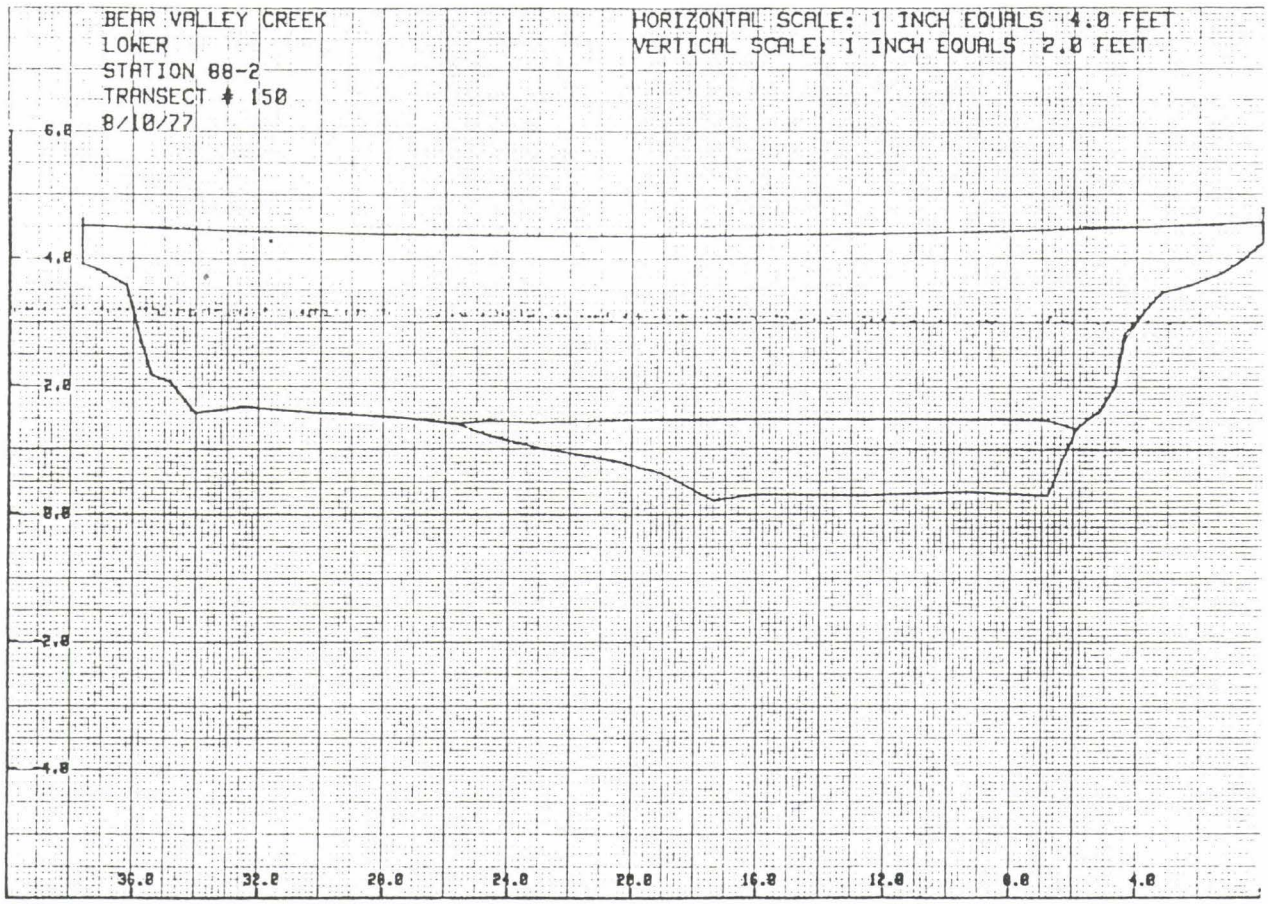
BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 155
8/10/77

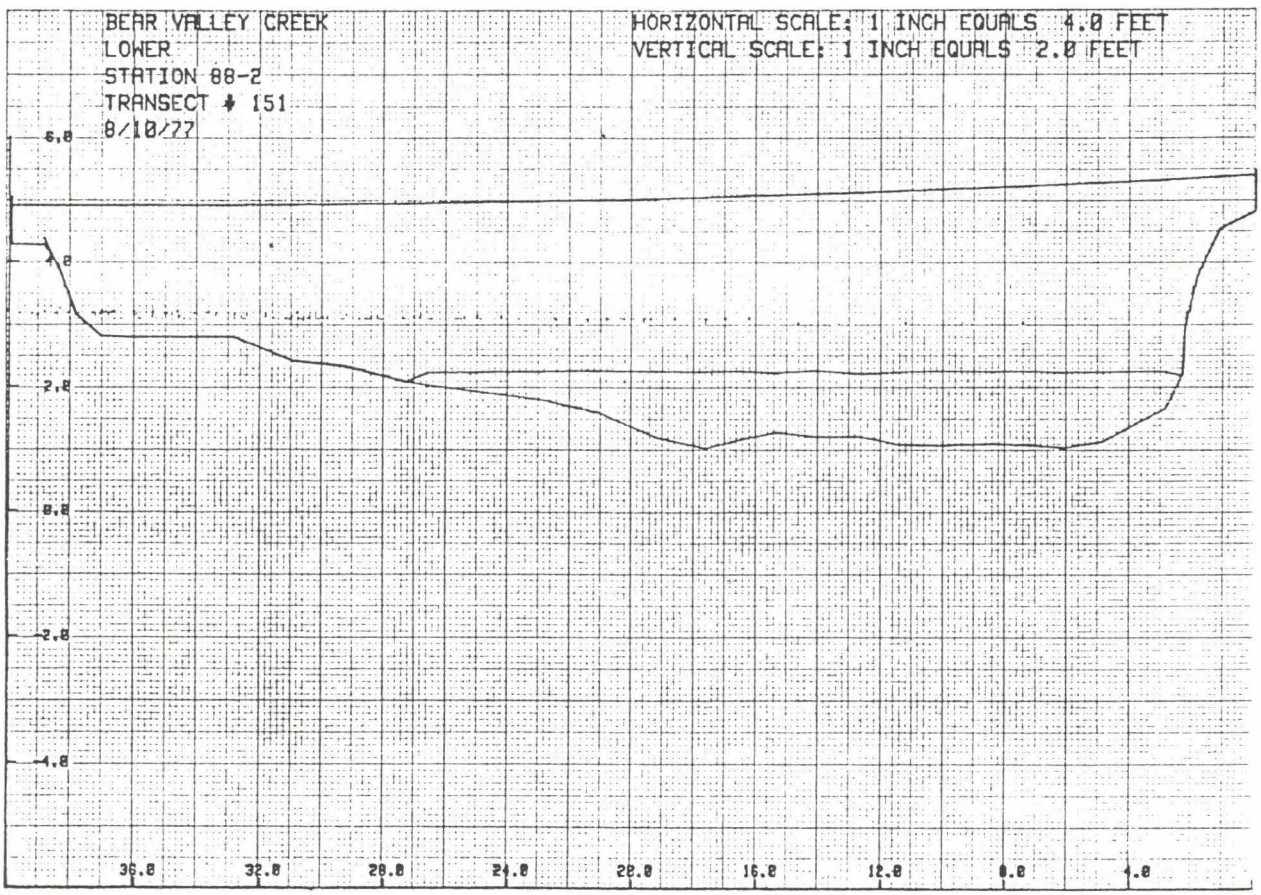
HORIZONTAL SCALE: 1 INCH EQUALS 4.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET

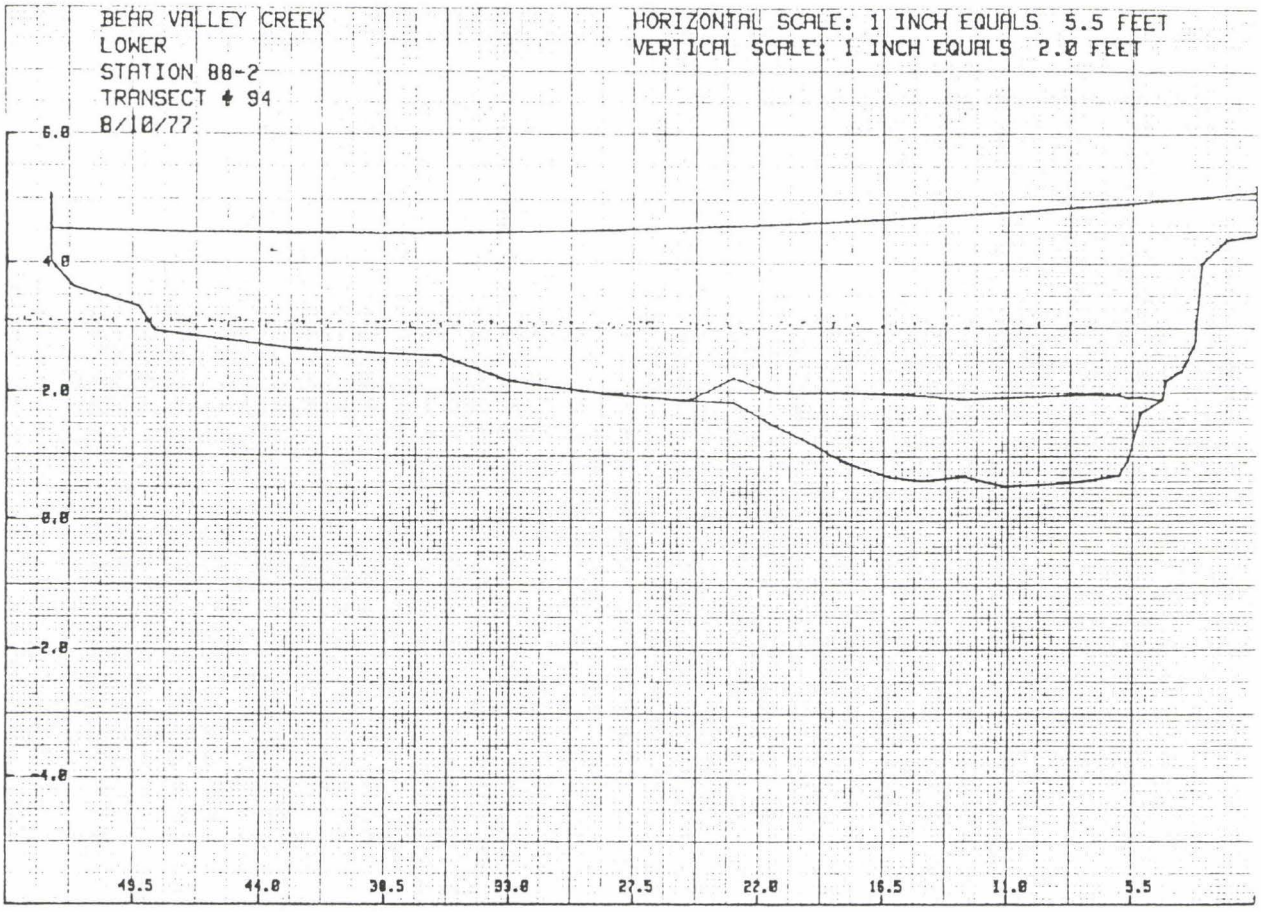


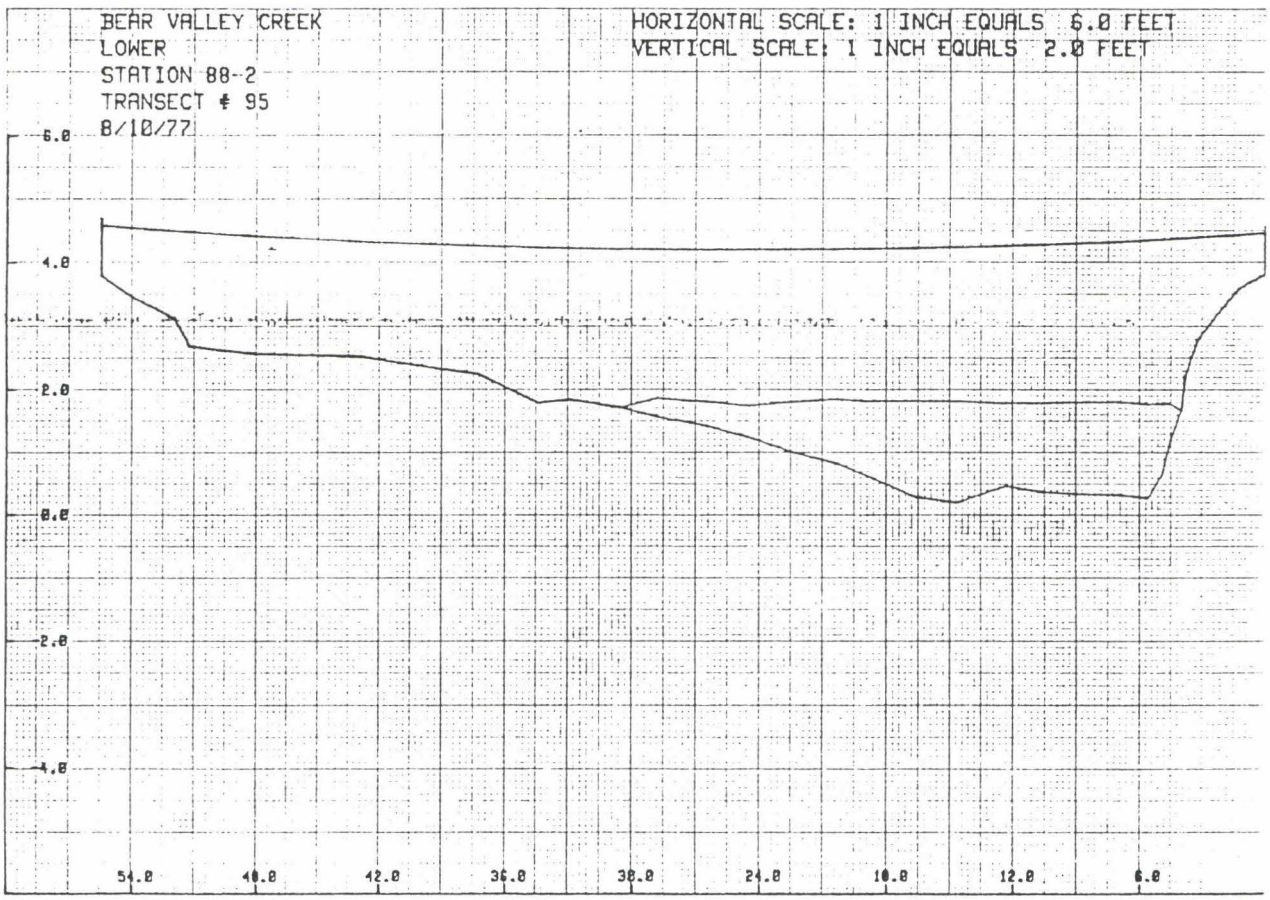

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 148
8/10/77
HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
36.0
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0

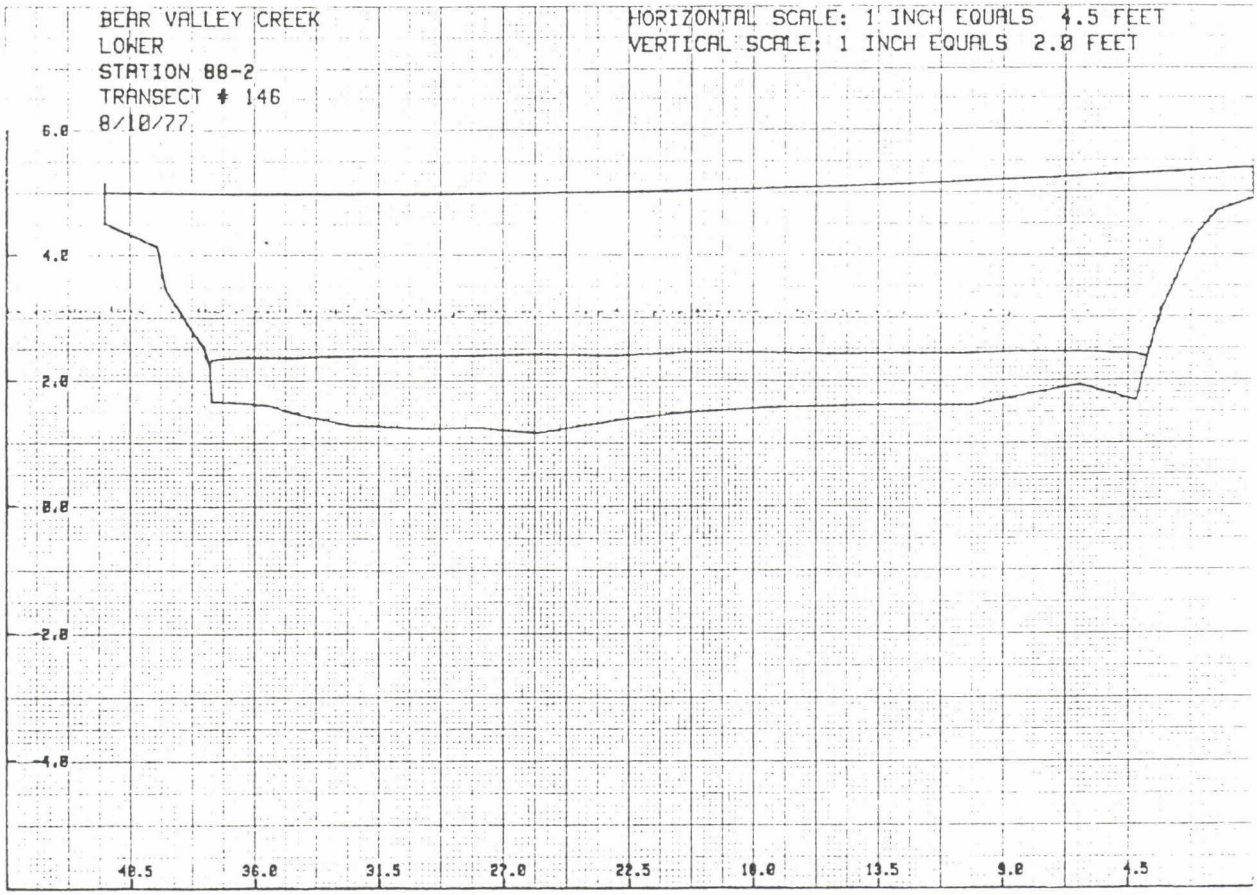

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 149
8/10/77
HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
36.0
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0

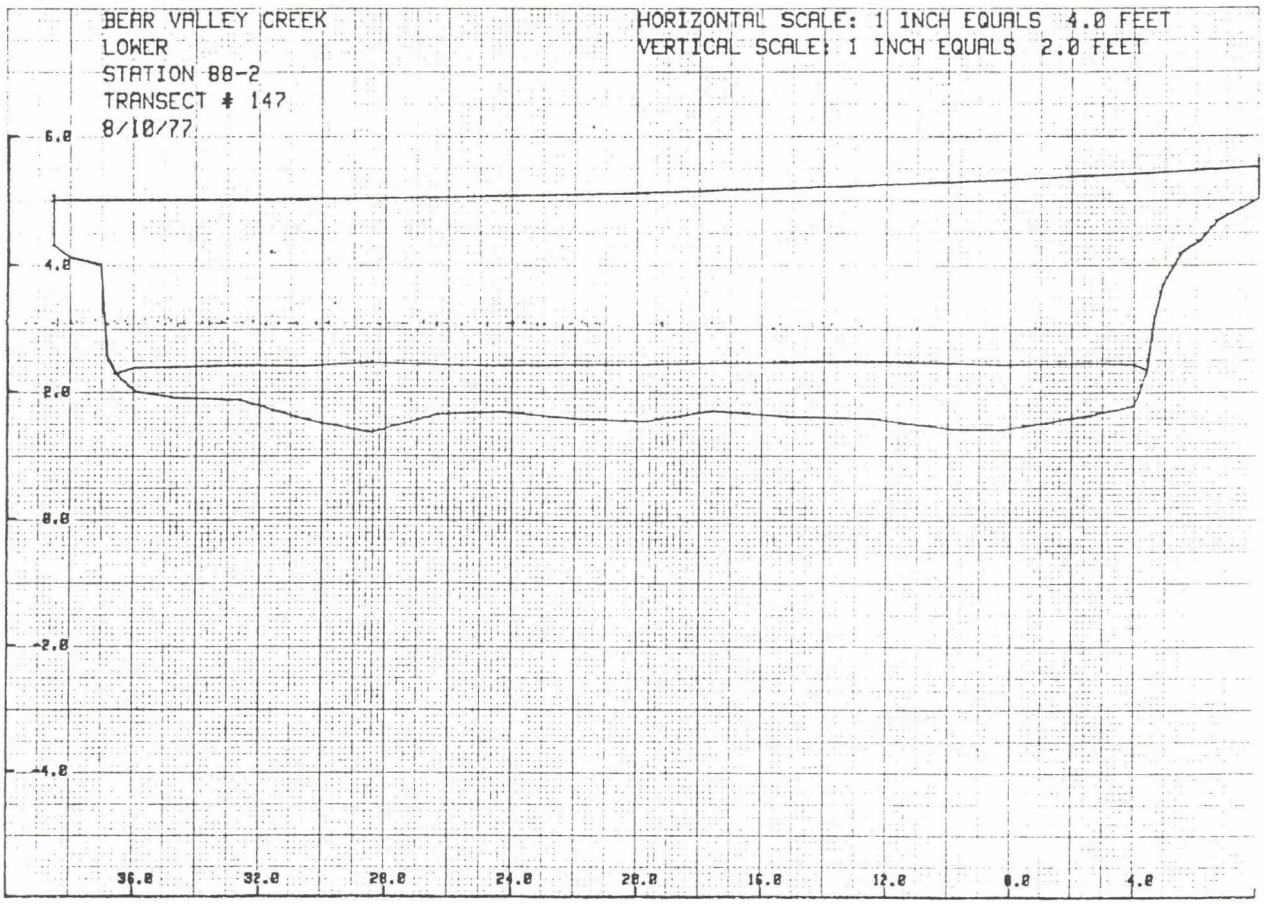

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 150
8/10/77
HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
36.0
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0

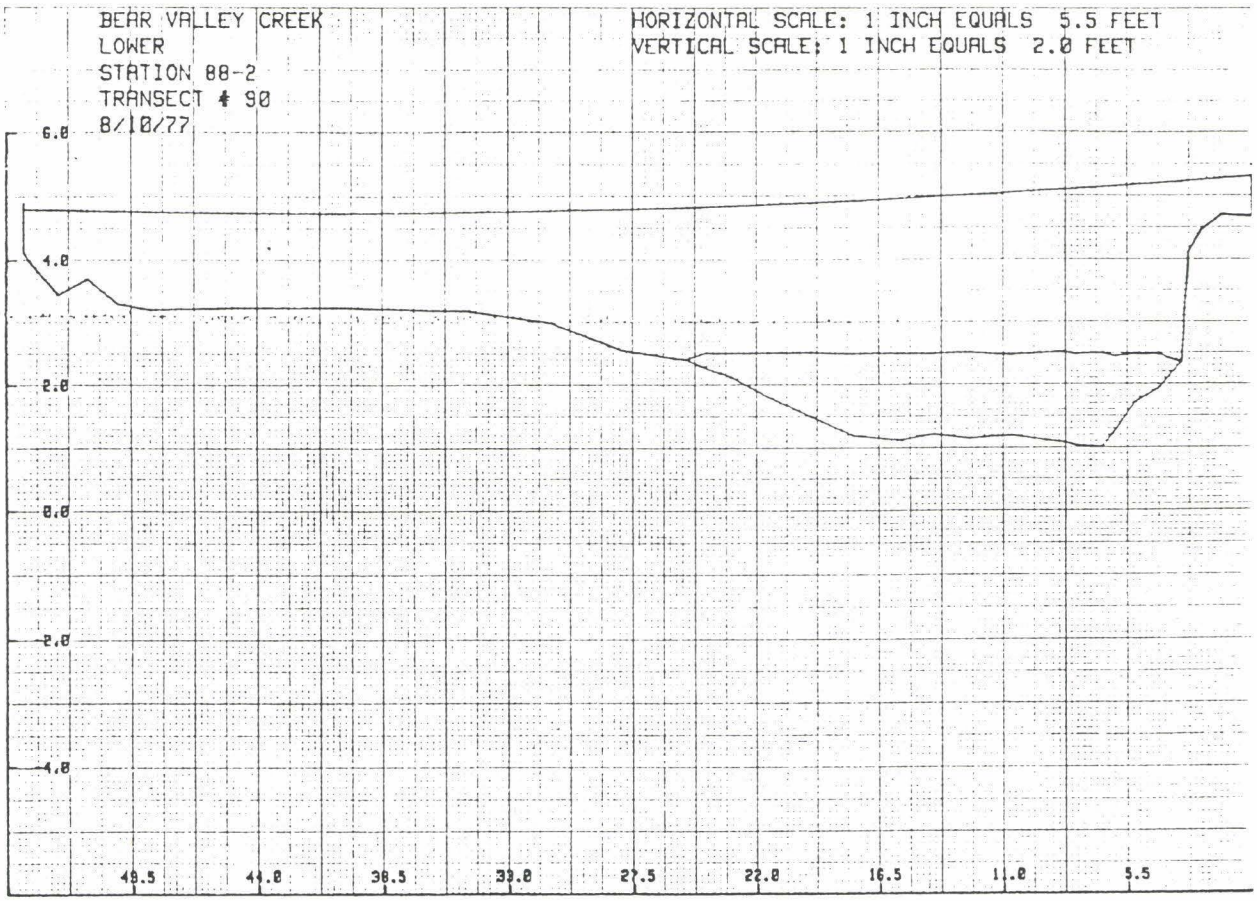

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 151
8/10/77
HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
36.0
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0

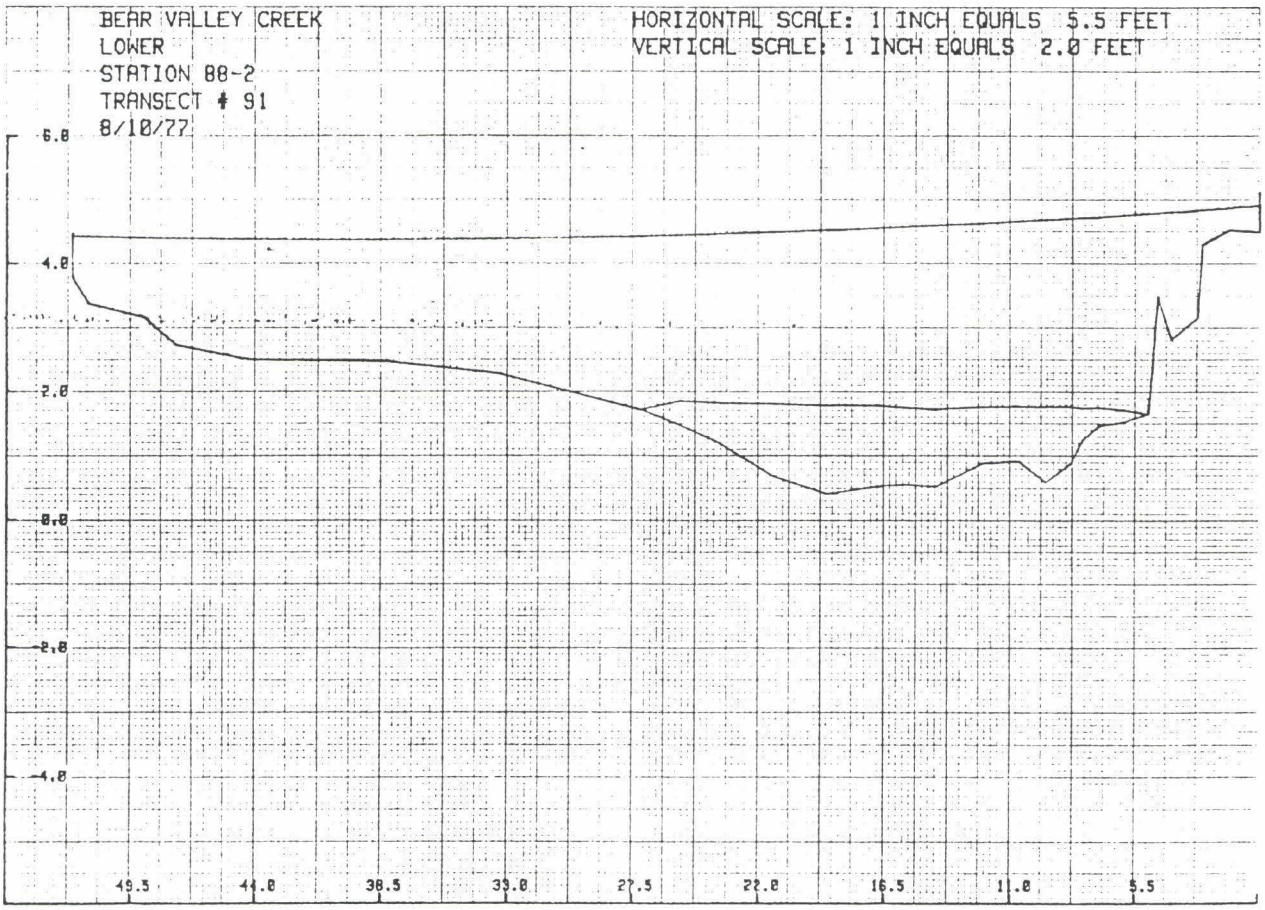

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT ℄ 94
8/10/77
HORIZONTAL SCALE: 1 INCH EQUALS 5.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
49.5
44.0
38.5
33.0
27.5
22.0
16.5
11.0
5.5

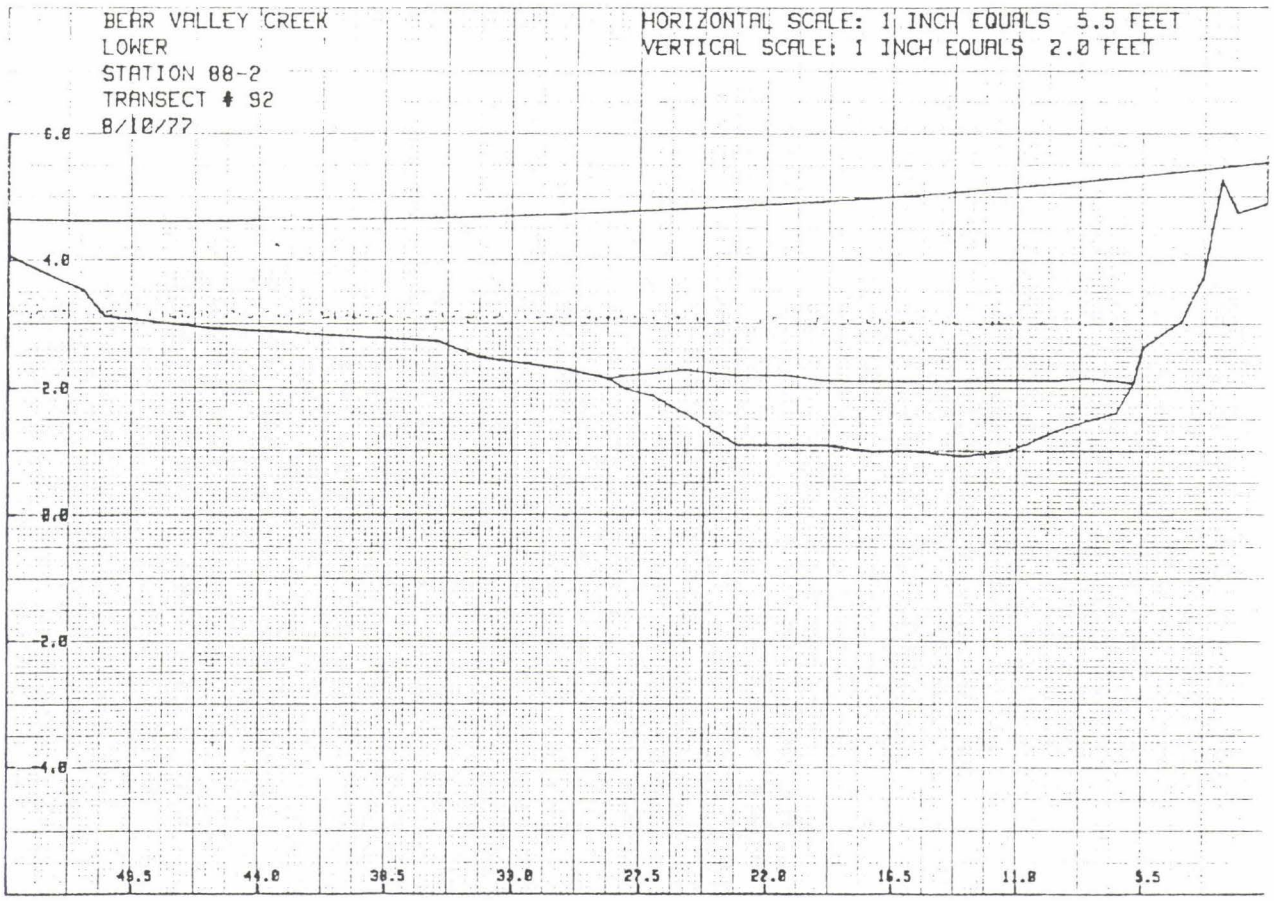

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT ℄ 95
8/10/77
HORIZONTAL SCALE: 1 INCH EQUALS 6.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
54.0
48.0
42.0
36.0
30.0
24.0
18.0
12.0
6.0


BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 146
8/10/77
HORIZONTAL SCALE: 1 INCH EQUALS 4.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
40.5
36.0
31.5
27.0
22.5
18.0
13.5
9.0
4.5


BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 147
8/10/77
HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
36.0
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0


BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 90
8/10/77
HORIZONTAL SCALE: 1 INCH EQUALS 5.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
49.5
44.0
38.5
33.0
27.5
22.0
16.5
11.0
5.5


BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 91
8/10/77
HORIZONTAL SCALE: 1 INCH EQUALS 5.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
49.5
44.0
38.5
33.0
27.5
22.0
16.5
11.0
5.5


BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 92
8/10/77
HORIZONTAL SCALE: 1 INCH EQUALS 5.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
49.5
44.0
38.5
33.0
27.5
22.0
16.5
11.0
5.5

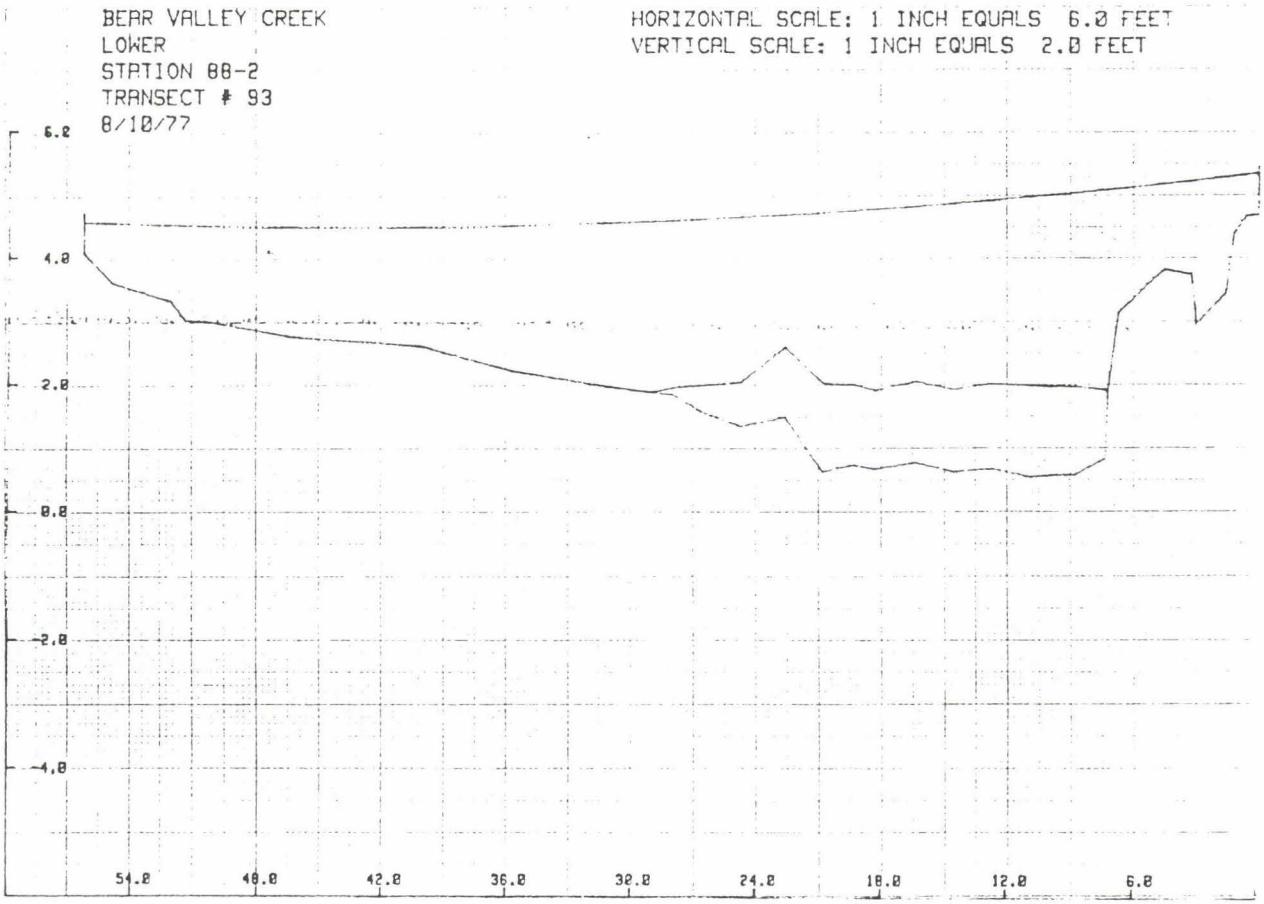

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 93
8/10/77
HORIZONTAL SCALE: 1 INCH EQUALS 6.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
54.0
48.0
42.0
36.0
30.0
24.0
18.0
12.0
6.0

Table A-20.--Fish population analysis results Lower Bear Valley, 1979.

SPECIES/STUDY SITE	Total catch	Population est. Number	95% C.I.[1/]	Mean length Inches (95% C.I.)	mm(95% C.I.)	Mean weight Ounces (95% C.I.)	gm (95% C.I.)
Chinook Salmon							
Site 1	302	317	306-328	2.49(2.44-2.53)	63.12(61.98-64.26)	0.10(0.09-0.11)	2.79(2.49-3.08)
Site 2	293	305	295-315	2.76(2.72-2.81)	70.21(69.09-71.33)	0.13(0.12-0.14)	3.77(3.50-4.04)
Site 3	171	182	172-192	NA[2/]	NA	NA	NA
Overall	766	805	787-823	NA	NA	NA	NA
Rainbow Trout							
Site 1	60	65	60-73	2.07(1.74-2.40)	52.70(44.32-61.08)	0.14(0.05-0.23)	3.98(1.46-6.50)
Site 2	27	27	27-28	2.83(2.35-3.31)	71.93(59.81-84.05)	0.22(0.14-0.31)	6.34(3.92-8.77)
Site 3	17	17	17-17	NA	NA	NA	NA
Overall	104	107	104-112	NA	NA	NA	NA
Eastern Brook Trout							
Site 1	27	27	27-28	3.59(2.89-4.28)	91.15(73.48-108.81)	0.53(0.17-0.90)	15.10(4.76-25.44)
Site 2	42	42	42-44	4.22(3.63-4.80)	107.10(92.29-121.90)	0.83(0.52-1.15)	23.67(14.78-32.57)
Site 3	33	33	33-34	4.44(3.92-4.97)	112.79(99.46-126.12)	0.78(0.49-1.06)	22.05(14.03-30.07)
Overall	102	103	102-105	4.12(3.78-4.47)	104.72(95.94-113.49)	0.74(0.55-0.92)	20.88)15.69-26.07)
Bull Trout							
Site 1	6	6	6-8	4.07(2.06-6.08)	103.33(52.24-154.43)	0.55(0.07-1.03)	15.67(2.08-29.26)
Site 2	6	6	6-8	4.91(2.60-7.23)	124.83(65.94-183.73)	0.96(0.18-1.73)	27.12(5.24-48.99)
Site 3	0	0	-	-	-	-	-
Overall	12	12	12-14	4.49(3.21-5.78)	114.08(81.47-146.70)	0.75(0.36-1.15)	21.39(10.21-32.57)

[1/] C.I. - Confidence interval.
[2/] NA - Not available at this time due to data entry or similar error; will be corrected in updated reports.

Table A-17.--Fish population analysis results Lower Bear Valley, 1976.

SPECIES/STUDY SITE	Total catch	Population est. Number	95% C.I.[1/]	Mean length Inches (95% C.I.)	mm(95% C.I.)	Mean weight Ounces (95% C.I.)	gm (95% C.I.)
Chinook Salmon							
Site 1	38	48	38-68	NA[2/]	NA	NA	NA
Site 2	14	20	14-43	2.39(2.23-2.55)	60.79(56.68-64.89)	0.09(0.07-0.11)	2.61(2.03-3.18)
Site 3	69	431	-	2.67(2.58-2.77)	67.94(65.62-70.26)	0.14(0.13-0.15)	3.97(3.62-4.32)
Overall	121	280	121-549	NA	NA	NA	NA
Rainbow Trout							
Site 1	46	48	46-53	NA	NA	NA	NA
Site 2	7	8	7-16	2.91(2.20-3.62)	74.0(55.97-92.03)	0.16(0.07-0.25)	4.57(2.00-7.14)
Site 3	24	26	24-33	3.28(2.88-3.68)	83.29(73.15-93.43)	0.28(0.15-0.41)	7.95(4.29-11.61)
Overall	77	86	77-99	NA	NA	NA	NA
Eastern Brook Trout							
Site 1	33	34	33-37	NA	NA	NA	NA
Site 2	6	7	6-16	4.23(2.26-6.19)	107(57.39-157.27)	0.25(<0.01-1.33)	7.33(0.10-37.77)
Site 3	20	20	20-22	NA	NA	NA	NA
Overall	59	63	59-70	NA	NA	NA	NA
Bull Trout							
Site 1	5	8	5-38	3.11(1.12-5.10)	79.0(28.50-129.50)	0.29(0.00-0.74)	8.24(0.00-20.97)
Site 2	8	12	8-37	2.58(1.70-3.47)	65.63(43.11-88.09)	0.16(0.00-0.38)	4.65(0.00-10.85)
Site 3	5	5	5-8	2.29(2.03-2.55)	58.20(51.55-64.85)	0.09(0.08-0.11)	2.60(2.16-3.04)
Overall	18	49	18-223	2.65(2.11-3.19)	67.28(53.57-80.98)	0.18(0.05-0.31)	5.08(1.48-8.67)

[1/] C.I. - Confidence interval.
[2/] NA - Not available at this time due to data entry or similar error; will be corrected in updated reports.

Table A-18.--Fish population analysis results Lower Bear Valley, 1977.

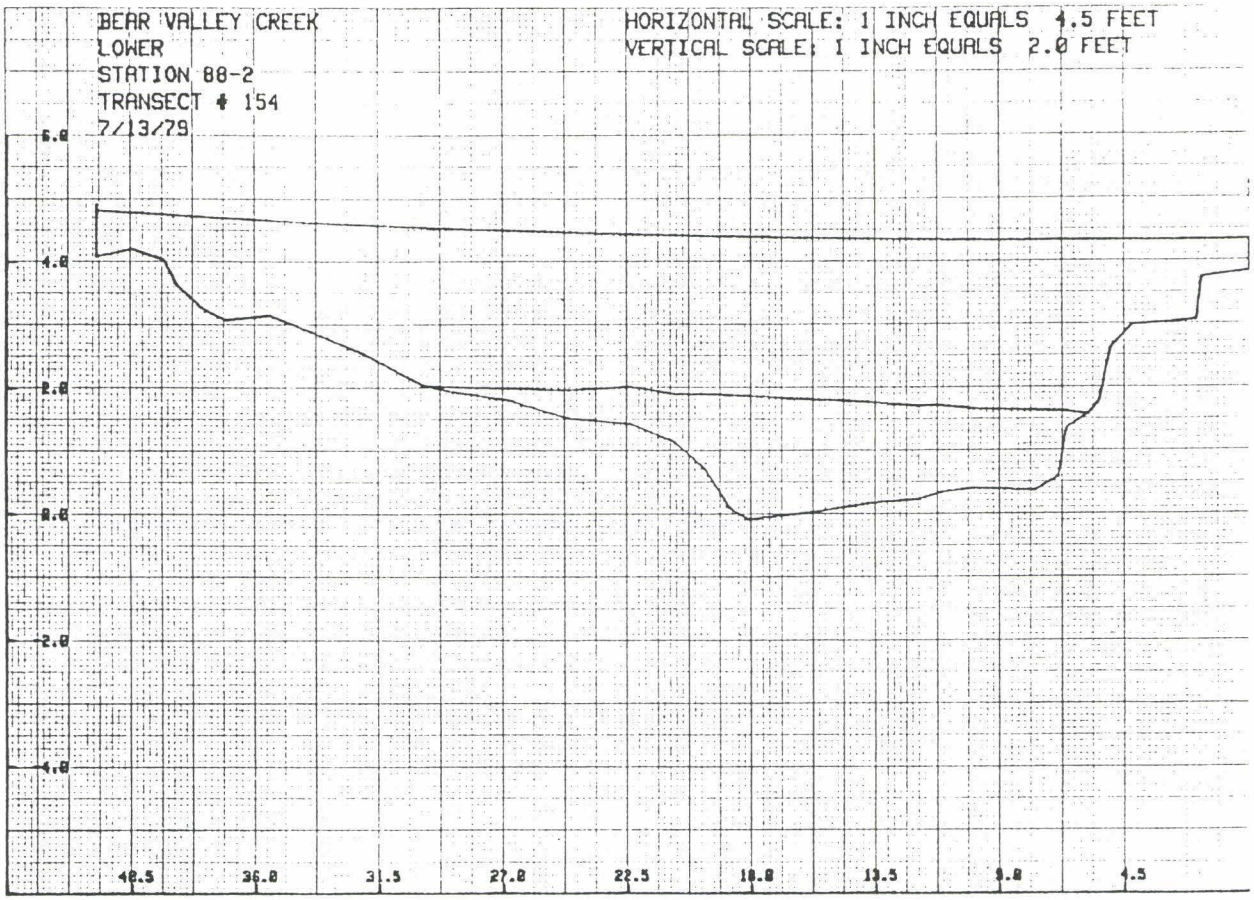
SPECIES/STUDY SITE	Total catch	Population est. Number	95% C.I.[1/]	Mean length Inches (95% C.I.)	mm(95% C.I.)	Mean weight Ounces (95% C.I.)	gm (95% C.I.)
Chinook Salmon							
Site 1	36	36	36-38	NA[2/]	NA	NA	NA
Site 2	22	22	22-23	3.45(3.10-3.80)	87.59(78.74-96.44)	0.35(0.22-0.48)	9.93(6.19-13.66)
Site 3	36	36	36-38	NA	NA	NA	NA
Overall	94	95	94-98	NA	NA	NA	NA
Rainbow Trout							
Site 1	11	11	11-12	5.14(3.99-6.29)	130(101.25-159.84)	1.24(0.61-1.87)	35.19(17.34-53.04)
Site 2	2	2	2-2	5.00(0.00-27.01)	127.00(0.00-686.06)	1.16(0.00-10.66)	32.80(0.00-302.17)
Site 3	2	2	2-4	3.76(2.01-5.51)	95.50(51.03-139-97)	0.27(0.00-0.79)	7.75(0.00-22.36)
Overall	15	15	15-16	4.94)4.02-5.86)	125(102.00-148.80)	1.10(0.60-1.60)	31.21(16.98-45.44)
Eastern Brook Trout							
Site 1	30	30	30-31	4.42(3.63-5.21)	112.33(92.22-132.45)	0.95(0.54-1.36)	26.92(15.30-38.55)
Site 2	32	32	32-33	4.59(3.70-5.49)	116.63(93.92-139.33)	1.35(0.70-2.01)	38.40(19.75-57.05)
Site 3	31	31	31-31	NA	NA	NA	NA
Overall	93	93	93-94	NA	NA	NA	NA
Bull Trout							
Site 1	27	29	27-35	2.66(2.12-3.20)	67.56(53.88-81.24)	0.24(0.08-0.40)	6.85(2.34-11.35)
Site 2	17	17	17-18	2.27(1.94-2.60)	57.65(49.28-66.01)	0.13(0.04(0.22)	2.70(1.20-6.20)
Site 3	21	21	21-23	2.12(1.99-2.24)	53.76(50.53-56.99)	0.13(0.10-0.15)	3.65(2.93(-4.36)
Overall	65	67	65-72	2.38(2.15-2.62)	60.51(54.53-66.49)	0.18(0.11-0.24)	4.99(3.08-0.24)

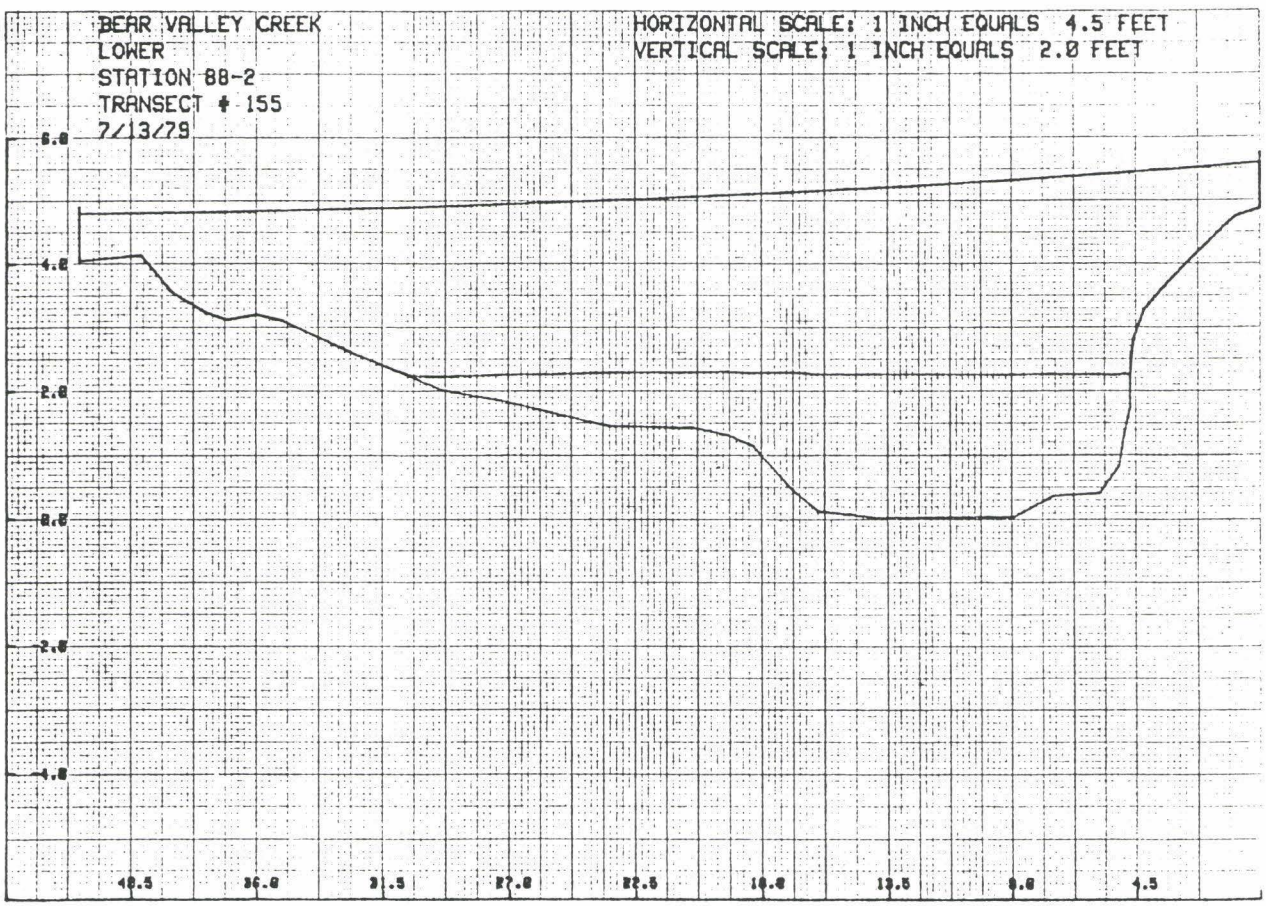
[1/] C.I. - Confidence interval.
[2/] NA - Not available at this time due to data entry or similar error; will be corrected in updated reports.

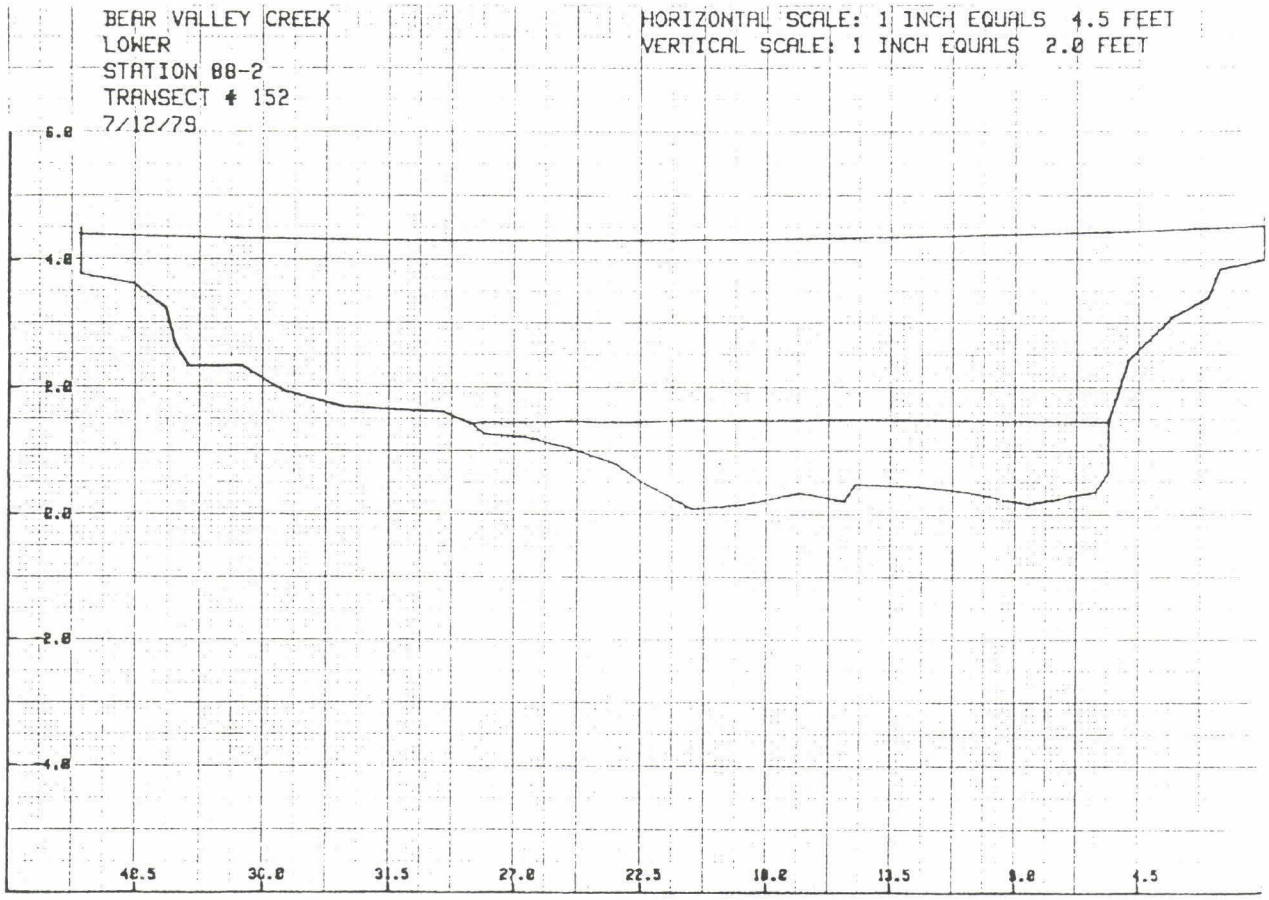
Table A-19.--Fish population analysis results Lower Bear Valley, 1978.

SPECIES/STUDY SITE	Total catch	Population est. Number	95% C.I.[1/]	Mean length Inches (95% C.I.)	mm(95% C.I.)	Mean weight Ounces (95% C.I.)	gm (95% C.I.)
Chinook Salmon							
Site 1	8	8	8-8	NA[2/]	NA	NA	NA
Site 2	26	26	26-27	3.29)3.09-3.50)	83.62(78.45-88.78)	0.22(0.16-0.27)	6.12(4.64-7.61)
Site 3	7	7	7-8	3.10(2.77-3.43)	78.71(70.40-87.03)	0.18(0.13-0.23)	5.01(3.57-6.46)
Overall	41	41	41-42	NA	NA	NA	NA
Rainbow Trout							
Site 1	2	2	2-4	6.10(0.00-13.61)	155.00(0.00-345.59)	1.51(0.00-9.13)	42.80(0.00-258.80)
Site 2	2	2	2-4	5.02(1.27-8.77)	127.50(32.31-222.79)	0.75(0.35-1.16)	21.40(9.96-32.84)
Site 3	1	-	-	6.38(0-0)	162.00(0.00-0.00)	1.66(0.00-0.00)	47.00(0.00-0.00)
Overall	5	5	5-5	5.72(4.73-6.72)	145.40(120.09-170.71)	1.24(0.47-2.00)	35.08(13.44-56.72)
Eastern Brook Trout							
Site 1	20	20	20-21	NA	NA	NA	NA
Site 2	41	41	41-42	3.35(2.79-3.92)	85.20(70.91-99.48)	0.51(0.26-0.76)	14.44(7.31-21.57)
Site 3	27	27	27-29	K too high			
Overall	88	88	88-90	NA	NA	NA	NA
Bull Trout							
Site 1	3	3	3-3	NA	NA	NA	NA
Site 2	3	3	3-3	5.59(5.14-6.04)	142.00(130.62-153.38)	0.87(0.67-1.06)	24.53(18.88-30.18)
Site 3	0	0	-	-	-	-	-
Overall	6	6	6-6	NA	NA	NA	NA

[1/] C.I. - Confidence interval.
[2/] NA - Not available at this time due to data entry or similar error; will be corrected in updated reports.


BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 154
7/13/79
HORIZONTAL SCALE: 1 INCH EQUALS 4.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
40.5
36.0
31.5
27.0
22.5
18.0
13.5
9.0
4.5


BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 155
7/13/79
HORIZONTAL SCALE: 1 INCH EQUALS 4.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
40.5
36.0
31.5
27.0
22.5
18.0
13.5
9.0
4.5


BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 152
7/12/79
HORIZONTAL SCALE: 1 INCH EQUALS 4.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
40.5
36.0
31.5
27.0
22.5
18.0
13.5
9.0
4.5

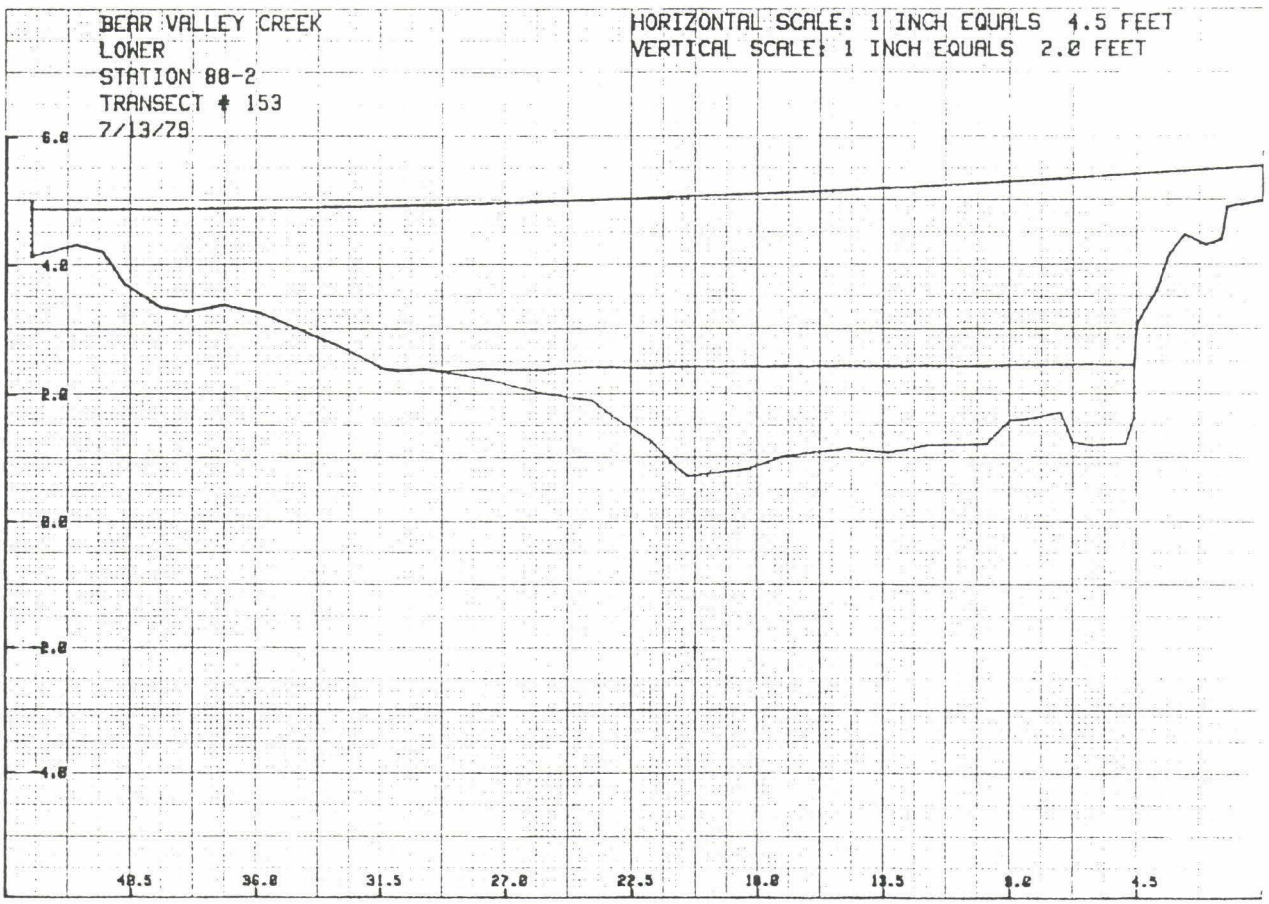

BEAR VALLEY CREEK
LOWER
STATION 88-2
TRANSECT # 153
7/13/79
HORIZONTAL SCALE: 1 INCH EQUALS 4.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
40.5
36.0
31.5
27.0
22.5
18.0
13.5
9.0
4.5

Table A-22.--Summary of geomorphic/aquatic analysis means, standard deviations, and 95 percent confidence intervals, Upper Bear Valley, 1975.

Variable	Site 1			Site 2			Site 3		
	Mean	S.D.[1/]	C.I.[2/]	Mean	S.D.	C.I.	Mean	S.D.	C.I.
Water Column									
Stream width (feet)	25.7	4.9	24.4-27.1	25.3	3.9	24.0-26.7	24.1	6.7	22.7-25.5
Stream depth (feet)	0.68	0.17	0.63-0.73	0.78	0.21	0.72-0.83	0.74	0.22	0.68-0.79
Riffle width (percent)	50.7	20.5	45.5-56.0	49.1	18.5	43.8-54.4	57.0	22.2	51.7-62.3
Pool width (percent)	49.3	20.5	44.0-54.5	50.9	18.5	45.7-56.2	43.0	22.2	37.7-48.3
Pool feature	5.9	2.3	5.4-6.3	6.5	1.6	6.0-7.0	6.5	1.7	6.0-7.0
Pool rating	3.0	1.1	2.7-3.3	3.5	0.8	3.2-3.8	3.3	1.3	8.0-3.6
Streambanks									
Bank angle (degrees)	95.0	27.1	88.41-101.5	100.5	21.7	93.9-107.1	101.8	27.3	95.2-108.4
Bank undercut (feet)	0.50	0.37	0.39-0.60	0.49	0.47	0.38-0.59	0.53	0.43	0.42-0.64
Bank depth	N.D.[3/]	-	-	N.D.	-	-	N.D.	-	-
Fisheries rating	2.9	0.6	2.8-3.1	2.7	0.5	2.5-2.8	2.5	0.6	2.3-2.6
Streambottom									
Fines <0.03 in. (percent)	33.5[4/]	27.7	27.1-40.0	36.8	23.6	30.3-43.3	30.5	24.0	24.0-37.0
Fines >0.03 in. (percent)	N.D.	-	-	N.D.	-	-	N.D.	-	-
Gravel (percent)	37.8	23.0	31.2-44.4	49.2	24.8	42.6-55.9	55.0	29.4	48.4-61.7
Rubble (percent)	18.1	14.9	14.2-21.9	11.0	11.9	7.1-14.9	9.7	17.9	5.8-13.6
Boulder (percent)	10.6[5/]	-	8.4-12.8	2.97	-	0.8-5.2	4.8	-	2.6-7.0
Substrate embeddedness	2.9	1.1	2.7-3.2	2.6	0.8	2.3-2.8	2.8	0.9	2.6-3.0
Instream veg. cover (feet)	N.D.	-	-	N.D.	-	N.D.	-	-	-

[1/] S.D. - Standard deviation
[2/] C.I. - Confidence interval
[3/] N.D. - No data
[4/] Boulders were separated into large and small from 1976 through 1978.
[5/] Fines were not separated into <0.03 and >0.03 in 1975.

APPENDIX 7

Annual geomorphic/aquatic analysis means, standard deviation, and 95 percent confidence intervals for Upper Bear Valley

Table A-24.--Summary of geomorphic/aquatic analysis means, standard deviations, and 95 percent confidence intervals, Upper Bear Valley, 1977.

Variable	Site 1			Site 2			Site 3		
	Mean	S.D.[1/]	C.I.[2/]	Mean	S.D.	C.I.	Mean	S.D.	C.I.
Water Column									
Stream width (feet)	32.6	6.1	30.93-34.32	30.6	6.3	28.84-32.26	29.6	7.1	27.91-31.33
Stream depth (feet)	0.6	0.21	0.53-0.67	0.6	0.24	0.53-0.67	0.7	0.33	0.61-0.74
Riffle width (percent)	62.3	18.9	56.57-67.96	66.0	23.1	60.24-71.73	57.7	24.4	51.96-63.45
Pool width (percent)	37.7	18.9	32.05-43.41	34.0	23.1	28.29-39.75	42.3	24.4	36.45-47.90
Pool feature	5.5	1.7	5.14-5.93	6.1	1.6	5.66-6.48	6.3	1.4	5.87-6.66
Pool rating	2.7	1.4	2.30-3.00	3.3	1.3	2.98-3.69	3.8	1.4	3.45-4.15
Streambanks									
Bank angle (degrees)	102.9	34.2	94.97-110.74	117.13	26.1	109.18-125.08	94.0	31.4	86.0-101.9
Bank undercut (feet)	0.3	0.5	0.23-0.43	0.1	0.3	0.05-0.25	0.4	0.5	0.32-0.52
Bank depth	N.D.[3/]	-	-	N.D.	-	-	N.D.	-	-
Fisheries rating	3.5	1.0	3.29-3.80	3.9	1.1	3.63-4.14	3.90	0.9	3.64-4.16
Streambottom									
Fines <0.03 in. (percent)	17.1	18.9	12.27-21.95	26.7	21.0	21.78-31.54	20.3	16.6	15.38-25.14
Fines >0.03 in. (percent)	17.2	16.1	12.19-21.27	18.3	17.1	14.26-22.41	19.3	14.1	15.23-23.38
Gravel (percent)	37.1	22.3	31.07-43.20	39.0	28.5	32.86-45.09	52.6	19.2	46.47-58.70
Rubble (percent)	25.9	19.5	21.63-30.24	15.1	18.9	10.78-19.46	7.7	10.4	3.35-12.03
Boulder (percent)	1.9[4/]	-	-	0.8	-	-	0.2	-	-
Substrate embeddedness	2.9	1.2	2.54-3.17	2.7	1.5	2.35-2.98	2.5	1.0	2.22-2.85
Instream veg. cover (feet)	N.D.	-	-	N.D.	-	-	N.D.	-	-

[1/] S.D. - Standard deviation
[2/] C.I. - Confidence interval
[3/] N.D. - No data
[4/] Boulders were separated into large and small from 1976 through 1978; data are combined here.

Table A-23.--Summary of geomorphic/aquatic analysis means, standard deviations, and 95 percent confidence intervals, Upper Bear Valley, 1976.

Variable	Site 1			Site 2			Site 3		
	Mean	S.D.[1/]	C.I.[2/]	Mean	S.D.	C.I.	Mean	S.D.	C.I.
Water Column									
Stream width (feet)	25.5	5.0	24.3-26.6	25.7	4.4	24.5-26.8	23.2	4.0	22.1-24.4
Stream depth (feet)	0.7	0.16	0.62-0.73	0.8	0.24	0.74-0.85	0.7	0.23	0.67-0.77
Riffle width (percent)	77.2	14.4	72.3-82.0	63.7	18.8	58.8-68.6	62.5	22.6	57.6-67.4
Pool width (percent)	22.8	14.4	18.0-27.7	36.3	18.8	31.4-41.2	37.5	22.6	32.7-42.4
Pool feature	5.2	1.6	4.8-5.6	5.5	2.0	5.1-5.9	6.3	1.3	5.9-6.8
Pool rating	3.0	1.4	2.7-3.3	3.4	1.0	3.1-3.7	3.4	1.1	3.1-3.7
Streambanks									
Bank angle (degrees)	119.0	21.6	113.2-124.9	124.6	24.4	118.7-130.5	121.2	22.5	115.3-127.1
Bank undercut (feet)	0.3	0.3	0.18-0.36	0.3	0.4	0.17-0.35	0.3	0.4	0.25-0.43
Bank depth	N.D.[3/]	-	N.D.	N.D.	-	N.D.	N.D.	-	N.D.
Fisheries rating	3.0	0.8	2.8-3.2	3.2	0.6	3.0-3.4	3.0	0.7	2.8-3.1
Streambottom									
Fines <0.03 in. (percent)	23.6[4/]	24.5	17.3-29.9	38.8	26.2	32.5-45.2	26.1	22.8	19.7-32.4
Fines >0.03 in. (percent)	N.D.	-	-	N.D.	-	-	N.D.	-	-
Gravel (percent)	41.8	24.3	34.9-48.7	43.5	29.0	36.5-50.5	61.5	27.5	54.6-68.5
Rubble (percent)	26.6	19.8	22.8-30.5	15.8	13.3	11.9-19.7	9.4	10.6	5.5-13.3
Boulder (percent)	7.9[5/]	-	6.4-10.0	1.8	-	0.2-3.5	2.9	-	1.3-4.5
Substrate embeddedness	3.4	1.3	3.1-3.6	2.9	1.0	2.7-3.2	3.1	0.9	2.8-3.4
Instream veg. cover (feet)	N.D.	-	-	N.D.	-	-	N.D.	-	-

[1/] S.D. - Standard deviation
[2/] C.I. - Confidence interval
[3/] N.D. - No data
[4/] Boulders were separated into large and small from 1976 through 1978.
[5/] Fines were not separated into <0.03 and >0.03 in 1975.

Table A-26.--Summary of geomorphic/aquatic analysis means, standard deviations and 95 percent confidence intervals, Upper Bear Valley, 1979.

Variable	Site 1			Site 2			Site 3		
	Mean	S.D.[1/]	C.I.[2/]	Mean	S.D.	C.I.	Mean	S.D.	C.I.
Water Column									
Stream width (feet)	24.3	5.3	23.2-25.5	24.3	4.2	23.1-25.5	22.1	4.3	20.1-23.3
Stream depth (feet)	0.62	0.15	0.57-0.68	0.76	0.24	0.71-0.81	0.66	0.23	0.61-0.72
Riffle width (percent)	69.3	15.6	62.3-76.2	50.1	33.7	43.1-57.2	60.5	24.3	53.5-67.5
Pool width (percent)	30.7	15.6	23.7-37.7	49.9	33.7	42.8-56.9	38.9	29.3	31.8-45.9
Pool feature	1.0	-	-	1.0	-	-	1.0	-	-
Pool rating	2.4	1.1	2.0-2.7	3.3	1.3	3.0-3.6	3.1	1.3	2.7-3.4
Streambanks									
Bank angle (degrees)	95	33	87-103	88	33	80-96	98	31	89-106
Bank undercut (feet)	0.26	0.25	0.20-0.32	0.30	0.25	0.23-0.36	0.28	0.21	0.22-0.34
Bank depth	0.17	0.20	0.11-0.22	0.20	0.21	0.15-0.26	0.26	0.23	0.20-0.32
Fisheries rating	2.1	0.9	1.9-2.3	2.6	0.9	2.3-2.8	2.3	0.7	2.1-2.5
Streambottom									
Fines <0.03 in. (percent)	11.8	11.1	7.0-16.7	23.0	20.5	18.6-27.9	22.8	23.5	17.8-27.7
Fines >0.03 in. (percent)	13.9	20.6	10.4-17.5	7.4	8.7	3.9-11.0	5.8	8.5	3.3-9.4
Gravel (percent)	42.8	27.5	35.8-49.8	52.7	27.1	45.7-59.8	62.8	27.6	55.7-69.8
Rubble (percent)	25.0	23.7	20.6-29.3	15.2	15.6	10.8-19.6	6.6	7.6	2.2-11.0
Boulder (percent)[3/]	6.4	7.6	5.1-7.8	1.6	2.9	0.2-3.0	2.0	4.5	0.6-3.4
Substrate embeddedness	2.8	0.5	2.6-3.0	2.6	0.7	2.4-2.8	2.4	0.8	2.2-2.6
Instream veg. cover (feet)	6.9	5.9	5.9-8.0	4.3	3.7	3.3-5.4	2.6	1.8	1.6-3.7

[1/] S.D. - Standard deviation
[2/] C.I. - Confidence interval
[3/] Boulders were separated into large and small from 1976 through 1978; data are combined here.

Table A-25.--Summary of geomorphic/aquatic analysis means, standard deviations and 95 percent confidence intervals, Upper Bear Valley, 1978.

Variable	Site 1			Site 2			Site 3		
	Mean	S.D.[1/]	C.I.[2/]	Mean	S.D.	C.I.	Mean	S.D.	C.I.
Water Column									
Stream width (feet)	26.6	5.3	25.28-27.90	26.7	4.0	25.36-28.01	26.2	5.9	24.89-27.54
Stream depth (feet)	0.72	0.17	0.66-0.78	0.92	0.26	0.86-0.98	0.93	0.27	0.86-0.99
Riffle width (percent)	84.9	11.4	80.71-89.15	75.4	17.6	71.19-79.7	77.2	19.4	72.9-81.4
Pool width (percent)	15.1	11.4	10.8-19.3	24.6	17.6	20.3-28.8	22.8	19.4	18.6-27.1
Pool feature	1.0	-	-	1.0	-	-	1.0	-	-
Pool rating	1.1	0.3	0.8-1.4	1.9	1.4	1.6-2.2	2.6	1.5	2.3-3.0
Streambanks									
Bank angle (degrees)	88	30	79-97	90	36	81-99	90	37	82-99
Bank undercut (feet)	0.26	0.18	0.20-0.31	0.26	0.23	0.21-0.32	0.30	0.22	0.25-0.36
Bank depth	0.23	0.20	0.17-0.29	0.25	0.24	0.19-0.32	0.32	0.30	0.25-0.38
Fisheries rating	2.4	0.6	2.2-2.6	2.4	0.8	2.2-2.6	2.6	0.8	2.4-2.8
Streambottom									
Fines <0.03 in. (percent)	2.6	5.3	0.8-4.4	6.4	7.9	4.6-8.2	4.7	7.5	2.9-6.5
Fines >0.03 in. (percent)	31.0	27.9	24.3-37.6	35.1	23.4	28.4-41.8	35.9	26.3	29.2-42.6
Gravel (percent)	34.9	24.7	27.9-41.9	42.5	26.8	35.5-49.6	50.8	30.3	43.7-57.9
Rubble (percent)	24.5	23.4	20.4-28.7	13.6	13.7	9.4-17.8	6.1	6.5	1.9-10.2
Boulder (percent)[3/]	6.8	-	-	2.9	-	-	2.0	-	-
Substrate embeddedness	2.8	1.0	2.6-3.0	2.4	1.0	2.1-2.6	2.4	0.74	2.2-2.6
Instream veg. cover (feet)	0.8	1.2	0.1-0.5	1.2	1.6	0.2-0.9	0.9	1.0	0.1-0.5

[1/] S.D. - Standard deviation
[2/] C.I. - Confidence interval
[3/] Boulders were separated into large and small from 1976 through 1987; data are combined here.

Table A-28--Summary of geomorphic/aquatic analysis means, standard deviations, and 95 percent confidence intervals, Upper Bear Valley, 1981.

Variable	Site 1			Site 2			Site 3		
	Mean	S.D.[1/]	C.I.[2/]	Mean	S.D.	C.I.	Mean	S.D.	C.I.
Water Column									
Stream width (feet)	27.4	4.1	26.3-28.6	25.7	4.0	24.6-26.8	25.3	5.2	24.2-26.4
Stream depth (feet)	0.82	0.17	0.76-0.88	0.95	0.23	0.89-1.01	0.91	0.27	0.85-0.96
Riffle width (percent)	65.2	28.7	59.1-71.3	61.5	20.6	55.3-67.6	69.8	21.1	63.7-76.0
Pool width (percent)	34.8	28.7	28.7-40.9	38.5	20.6	32.4-44.7	30.1	21.1	24.0-36.3
Pool feature	6.1	-	-	7.2	-	-	5.5	-	-
Pool rating	2.5	1.4	2.2-2.9	3.6	1.3	3.2-4.0	2.7	1.4	2.3-3.0
Streambanks									
Bank angle (degrees)	103	31	95-116	90	35	82-99	102	32	94-110
Bank undercut (feet)	0.26	0.22	0.20-0.32	0.38	0.28	0.32-0.44	0.34	0.23	0.27-0.40
Bank depth	0.30	0.30	0.22-0.38	0.40	0.32	0.32-0.48	0.48	0.34	0.40-0.56
Fisheries rating	1.9	0.6	1.7-2.1	2.4	0.9	2.2-2.6	2.2	0.8	2.0-2.4
Streambottom									
Fines <0.03 in. (percent)	24.9	19.3	19.6-30.2	28.3	19.6	22.9-33.6	27.8	23.1	22.4-33.1
Fines >0.03 in. (percent)	9.2	13.6	6.5-11.8	10.3	8.9	7.6-13.0	6.8	7.5	4.1-9.4
Gravel (percent)	37.5	24.5	30.8-44.1	46.8	24.5	40.1-53.5	54.2	28.5	47.5-60.9
Rubble (percent)	20.8	18.9	16.9-24.6	12.4	14.9	8.5-16.2	8.3	9.7	4.4-12.2
Boulder (percent)[3/]	7.6	8.6	6.1-9.2	2.2	3.6	0.6-3.7	3.8	4.6	2.2-5.3
Substrate embeddedness	2.8	1.2	2.5-3.0	3.0	0.8	2.7-3.2	2.7	1.0	2.5-3.0
Instream veg. cover (feet)	1.8	1.9	1.5-2.2	1.4	1.3	1.6-1.7	0.8	0.8	0.4-1.2

[1/] S.D. - Standard deviation
[2/] C.I. - Confidence interval
[3/] Boulders were separated into large and small from 1976 through 1978; data are combined here.

Table A-27.--Summary of geomorphic/aquatic analysis means, standard deviations, and 95 percent confidence intervals, Upper Bear Valley, 1980.

Variable	Site 1			Site 2			Site 3		
	Mean	S.D.[1/]	C.I.[2/]	Mean	S.D.	C.I.	Mean	S.D.	C.I.
Water Column									
Stream width (feet)	26.2	4.6	25.1-27.3	25.1	3.6	24.0-26.2	24.0	4.3	22.9-25.1
Stream depth (feet)	0.79	0.14	0.74-0.85	0.92	0.24	0.87-0.98	0.81	0.24	0.76-0.87
Riffle width (percent)	24.0	30.2	18.2-29.8	7.5	19.1	1.6-13.3	8.5	16.0	2.6-14.3
Pool width (percent)	76.0	30.2	70.2-81.8	92.5	19.1	86.7-98.4	91.5	16.0	85.7-97.4
Pool feature	1.0	-	-	1.0	-	-	1.0	-	-
Pool rating	2.7	1.6	2.5-3.0	4.9	0.6	4.6-5.1	4.9	0.7	4.6-5.1
Streambanks									
Bank angle (degrees)	100	26	93-107	93	33	86-101	100	28	93-108
Bank undercut (feet)	0.22	0.23	0.16-0.29	0.34	0.28	0.27-0.41	0.33	0.29	0.26-0.40
Bank depth	0.21	0.21	0.14-0.28	0.29	0.29	0.21-0.36	0.38	0.34	0.31-0.45
Fisheries rating	2.9	0.8	2.6-3.1	3.6	0.9	3.4-3.8	3.8	0.8	3.6-4.0
Streambottom									
Fines <0.03 in. (percent)	20.4	19.4	15.7-25.0	24.3	19.1	19.6-29.1	19.6	16.3	14.9-24.3
Fines >0.03 in. (percent)	6.4	8.9	3.4-9.4	10.4	11.3	7.4-13.5	11.0	14.3	7.9-14.0
Gravel (percent)	40.4	23.9	33.6-47.2	48.1	25.7	41.3-55.0	52.6	30.0	45.7-59.5
Rubble (percent)	23.2	18.9	19.6-27.5	14.4	16.1	10.1-18.7	12.8	14.4	8.5-17.1
Boulder (percent)[3/]	9.0	7.9	7.4-10.6	2.7	3.9	1.1-4.3	4.1	6.1	2.5-5.7
Substrate embeddedness	2.7	1.3	2.5-3.0	2.8	0.9	2.5-3.1	2.9	0.9	2.6-3.1
Instream veg. cover (feet)	2.1	2.2	1.7-2.5	1.0	1.1	0.6-1.4	0.4	0.7	0.1-0.8

[1/] S.D. - Standard deviation
[2/] C.I. - Confidence interval
[3/] Boulders were separated into large and small from 1976 through 1978; data are combined here.

Table A-30.--Summary of geomorphic/aquatic analysis means, standard deviations, and 95 percent confidence intervals, Upper Bear Valley, 1985.

Variable	Site 1			Site 2			Site 3		
	Mean	S.D.[1/]	C.I.[2/]	Mean	S.D.	C.I.	Mean	S.D.	C.I.
Water Column									
Stream width (feet)	26.2	0.5	25.1-27.2	24.7	0.5	23.6-25.7	23.8	0.5	22.6-25.0
Channel width (feet)	27.4	0.6	26.1-28.6	26.1	0.7	24.7-27.4	25.2	0.7	23.9-26.5
Stream depth (feet)	0.70	0.02	0.66-0.75	0.88	0.04	0.81-0.94	0.85	0.03	0.79-0.92
Riffle width (percent)	23.3	2.9	17.7-29.0	25.2	2.2	20.9-29.4	21.7	1.1	19.4-23.9
Pool width (percent)	76.7	2.9	71.0-82.3	74.8	2.2	70.6-79.1	78.3	1.1	76.1-80.6
Pool quality	2.8	NA[4/]	NA	3.9	NA	NA	3.4	NA	NA
Pool feature	5.7	NA	NA	5.0	NA	NA	5.1	NA	NA
Streambanks									
Bank angle (degrees)	105	4	97-113	102	4	94-111	104	4	95-112
Bank undercut (feet)	0.20	0.03	0.15-0.26	0.29	0.04	0.22-0.36	0.29	0.04	0.22-0.37
Shore depth (feet)	0.26	0.04	0.19-0.34	0.32	0.04	0.24-0.40	0.41	0.05	0.31-0.50
Streambottom									
Total fines (percent)	41.3	NA	NA	38.7	NA	NA	50.2	NA	NA
Fines <0.03 in. (percent)	23.2	2.0	19.2-27.1	28.2	22.8	22.8-33.6	40.1	3.2	33.7-46.4
Fines >0.03 in. (percent)	18.1	2.0	14.2-22.1	10.5	1.3	8.0-12.9	10.1	1.1	7.9-12.3
Gravel (percent)	33.4	2.5	28.4-38.3	45.5	3.7	38.2-52.8	42.2	3.4	35.6-48.8
Rubble (percent)	9.3	1.4	6.5-12.1	10.7	1.5	7.8-13.6	3.3	0.7	2.0-4.6
Boulder (percent)[3/]	16.0	2.0	12.0-20.0	5.1	0.8	3.5-6.8	4.3	1.0	2.3-6.3
Embeddedness (percent)	87.2	0.9	85.3-89.0	90.4	0.9	88.5-92.2	89.9	1.1	87.7-92.0
Instream cover (feet)	6.6	0.6	5.5-7.7	4.1	0.4	3.3-5.0	3.7	0.4	3.0-4.4

[1/] S.D. - Standard deviation
[2/] C.I. - Confidence interval
[3/] Boulders were separated into large and small from 1976 through 1978; data are combined here.
[4/] Not available

Table A-29.--Summary of geomorphic/aquatic analysis means, standard deviations, and 95 percent confidence intervals, Upper Bear Valley, 1982.

Variable	Site 1			Site 2			Site 3		
	Mean	S.D.[1/]	C.I.[2/]	Mean	S.D.	C.I.	Mean	S.D.	C.I.
Water Column									
Stream width (feet)	29.4	4.7	27.7-31.1	28.2	5.1	26.5-29.9	28.0	9.1	26.3-29.8
Stream depth (feet)	1.12	0.25	1.06-1.18	1.22	0.23	1.15-1.28	1.22	0.25	1.15-1.28
Riffle width (percent)	30.1	34.6	23.4-36.8	10.0	20.6	3.3-16.8	11.0	20.3	4.3-17.7
Pool width (percent)	69.9	34.6	63.2-76.6	90.0	20.6	83.2-96.7	89.0	30.3	82.3-95.8
Pool feature	5.4	-	-	5.1	-	-	5.1	-	-
Pool rating	3.7	0.8	3.5-3.8	3.9	0.4	3.8-4.1	3.9	0.5	3.7-4.1
Streambanks									
Bank angle (degrees)	88	31	79-96	82	33	73-91	94	36	86-103
Bank undercut (feet)	0.32	0.22	0.25-0.39	0.47	0.31	0.40-0.54	0.39	0.28	0.32-0.45
Bank depth	0.52	0.35	0.42-0.63	0.64	0.45	0.54-0.75	0.68	0.42	0.56-0.74
Fisheries rating	3.3	0.6	3.1-3.5	3.4	0.7	3.2-3.6	3.3	0.7	3.1-3.5
Streambottom									
Fines <0.03 in. (percent)	22.2	15.7	17.9-26.5	26.3	17.7	21.9-30.7	21.2	17.4	16.8-25.6
Fines >0.03 in. (percent)	13.4	16.9	10.3-16.5	12.8	9.8	9.7-16.0	7.4	7.8	4.3-10.6
Gravel (percent)	34.3	24.4	28.2-40.5	47.8	23.6	41.6-54.0	61.2	24.2	55.0-67.4
Rubble (percent)	18.2	16.0	15.2-21.1	9.8	10.0	6.8-12.8	6.0	6.8	3.0-9.0
Boulder (percent)[3/]	11.9	11.7	9.8-14.0	3.2	4.7	1.1-5.4	4.1	6.5	2.0-6.3
Substrate embeddedness	2.4	0.9	2.2-2.6	2.7	0.9	2.4-2.9	2.7	0.7	2.5-2.9
Instream veg. cover (feet)	2.3	1.0	1.9-2.7	1.8	1.5	1.4-2.3	2.3	2.2	1.9-2.7

[1/] S.D. - Standard deviation
[2/] C.I. - Confidence interval
[3/] Boulders were separated into large and small from 1976 through 1978; data are combined here.

Table A-31.--Riparian analysis means, standard deviation and 95 percent confidence intervals for Upper Bear Valley, 1975.

Variable	Site 1			Site 2			Site 3		
	Mean	S.D.[1/]	C.I.[2/]	Mean	S.D.	C.I.	Mean	S.D.	C.I.
Habitat type	12.8	3.1	11.9-13.0	13.2	3.1	12.3-14.2	12.5	4.7	11.5-13.5
Bank cover stability	2.6	0.5	2.5-2.8	2.0	0.4	1.9-2.2	2.0	0.4	1.9-2.2
Stream cover	2.4	0.5	2.3-2.6	1.7	0.6	1.5-1.8	1.7	0.5	1.5-1.8
Bank alteration (percent)									
natural	39	16	35-43	42	16	38-46	46	15	42-50
artificial	0	0	0-1	0	0	0-1	2	5	1-2
total	39	-	-	42	-	-	48	-	-
Vegetation use (percent)	1	3	0-1	0	1	0-1	0	1	0-1
Vegetative overhang (feet)	0.97	0.60	0.82-1.13	0.82	0.66	0.66-0.98	0.84	0.59	0.68-1.00

Table A-32.--Riparian analysis means, standard deviation and 95 percent confidence intervals for Upper Bear Valley, 1976.

Variable	Site 1			Site 2			Site 3		
	Mean	S.D.	C.I.	Mean	S.D.	C.I.	Mean	S.D.	C.I.
Habitat type	14.7	3.2	17.71-15.77	12.9	4.9	11.86-13.94	14.1	3.7	13.04-15.12
Bank cover stability	2.6	0.3	2.47-2.78	2.2	0.5	2.08-2.39	2.3	0.4	2.15-2.45
Stream cover	2.0	0.0	2.0-2.0	2.0	0.0	2.0-2.0	2.0	0.0	2.0-2.0
Bank alteration (percent)									
natural	15	11	13-18	10	7	8-13	13	9	11-15
artificial	19	11	16-22	23	13	20-26	28	11	25-31
total	34.6	-	-	33.4	-	-	40.6	-	-
Vegetation use (percent)	73	8	71-75	76	11	73-78	80	4	78-83
Vegetative overhang (feet)	0.70	0.47	0.59-0.81	0.51	0.38	0.40-0.62	0.62	0.44	0.51-0.73

[1/] S.D. - Standard deviation
[2/] C.I. - 95 percent confidence interval

APPENDIX 8

Annual riparian analysis means, standard deviations, and 95 percent confidence intervals for Upper Bear Valley.

Table A-35.--Riparian analysis means, standard deviation and 95 percent confidence intervals for Upper Bear Valley, 1979.

Variable	Site 1			Site 2			Site 3		
	Mean	S.D.[1/]	C.I.[2/]	Mean	S.D.	C.I.	Mean	S.D.	C.I.
Habitat type	15.0	3.8	14.2-15.8	16.0	2.9	15.2-16.8	14.0	2.5	13.6-15.2
Bank cover stability	2.8	0.6	2.6-3.0	3.0	0.8	2.8-3.1	2.7	0.7	2.5-2.9
Stream cover	1.9	0.3	1.8-2.0	2.0	0.4	1.9-2.1	1.9	0.3	1.8-2.0
Bank alteration (percent)									
natural	23	16	19-26	27	15	24-31	17	10	14-21
artificial	12	8	10-14	8	6	7-10	18	7	16-20
total	35	-	-	35	-	-	35	-	-
Vegetation use (percent)	4	5	2-5	1	4	0-2	62	6	61-64
Vegetative overhang (feet)	0.35	0.27	0.29-0.40	0.21	0.20	0.15-0.27	0.22	0.18	0.17-0.28

Table A-36.--Riparian analysis means, standard deviation and 95 percent confidence intervals for Upper Bear Valley, 1980.

Variable	Site 1			Site 2			Site 3		
	Mean	S.D.	C.I.	Mean	S.D.	C.I.	Mean	S.D.	C.I.
Habitat type	15.5	3.5	14.4-16.5	14.7	4.4	13.6-15.7	12.2	4.6	11.1-13.3
Bank cover stability	2.7	0.5	2.6-2.9	2.8	0.8	2.6-2.9	1.9	0.8	1.7-2.1
Stream cover	2.0	0.6	1.8-2.1	1.9	0.5	1.7-2.0	1.6	0.5	1.5-1.7
Bank alteration (percent)									
natural	11	10	10-13	10	7	8-11	5	3	3-7
artificial	35	11	31-38	24	12	21-27	46	16	43-50
total	46	-	-	34	-	-	51	-	-
Vegetation use (percent)	76	14	74-79	1	8	0-4	78	5	75-81
Vegetative overhang (feet)	0.38	0.25	0.30-0.45	0.53	0.41	0.46-0.61	0.21	0.18	0.14-0.29

[1/] S.D. - Standard deviation
[2/] C.I. - 95 percent confidence interval

Table A-33.--Riparian analysis means, standard deviation and 95 percent confidence intervals for Upper Bear Valley, 1977.

Variable	Site 1			Site 2			Site 3		
	Mean	S.D.[1/]	C.I.[2/]	Mean	S.D.	C.I.	Mean	S.D.	C.I.
Habitat type	14.2	3.9	13.19-15.13	13.2	4.6	12.21-14.16	13.9	4.7	12.89-14.84
Bank cover stability	2.8	0.7	2.57-2.94	2.8	0.9	2.63-3.01	2.6	0.9	2.44-2.82
Stream cover	1.9	0.4	1.76-1.94	1.9	0.4	1.83-2.01	2.0	0.5	1.88-2.06
Bank alteration (percent)									
natural	23.9	14	21.19-26.61	25.3	12	22.60-28.06	23.3	13	20.52-25.98
artificial	11.7	5	8.72-14.72	15.8	14	12.74-18.79	8.6	7	5.56-11.61
total	35.6	-	-	41.1	-	-	31.9	-	-
Vegetation use (percent)	78.8	5	77.64-79.87	77.0	35	75.84-78.09	79.3	14	78.13-80.37
Vegetative overhang (feet)	0.64	0.87	0.47-0.83	0.61	0.63	0.42-0.79	0.55	0.48	0.36-0.73

Table A-34.--Riparian analysis means, standard deviation and 95 percent confidence intervals for Upper Bear Valley, 1978.

Variable	Site 1			Site 2			Site 3		
	Mean	S.D.	C.I.	Mean	S.D.	C.I.	Mean	S.D.	C.I.
Habitat type	14.9	3.6	13.8-16.1	12.8	5.3	11.6-13.9	12.3	4.3	11.1-13.4
Bank cover stability	3.2	0.8	3.0-3.4	3.1	0.8	29.9-3.3	3.2	0.8	3.0-3.4
Stream cover	1.9	0.4	1.8-2.0	1.9	0.3	1.8-2.0	1.9	0.3	1.8-2.0
Bank alteration (percent)									
natural	9	8	6-12	18	14	15-20	15	8	12-17
artificial	73	13	68-78	45	25	40-50	67	18	62-72
total	82	-	-	63	-	-	82	-	-
Vegetation use (percent)	78	10	76-80	1	1	0-2	13	9	10-14
Vegetative overhang (feet)	0.20	0.23	0.12-0.27	0.34	0.36	0.27-0.42	0.30	0.26	0.22-0.37

[1/] S.D. - Standard deviation
[2/] C.I. - 95 percent confidence interval

Table A-39.--Riparian analysis means, standard deviation and 95 percent confidence intervals for Upper Bear Valley, 1985.

Variable	Site 1			Site 2			Site 3		
	Mean	S.D.[1/]	C.I.[2/]	Mean	S.D.	C.I.	Mean	S.D.	C.I.
Habitat type	11.8	0.6	10.7-12.9	13.4	0.5	12.4-14.3	12.0	0.5	11.0-12.9
Bank cover stability	64	3	59-69	66	3	61-72	55	3	49-60
Stream cover	3.0	0.1	2.9-3.1	3.0	0.1	2.9-3.1	3.0	.0	2.9-3.1
Bank alteration (percent)									
natural	35	2	31-40	41	2	36-46	19	1	16-21
artificial	24	2	20-27	6	1	3-8	43	3	38-48
total	59	NA[3/]	NA	47	NA	NA	62	NA	NA
Vegetation use (percent)	13	1	10-15	1	1	0-2	57	2	53-60
Vegetative overhang (feet)	0.29	0.04	0.21-0.36	0.38	0.04	0.29-0.47	0.24	0.03	0.19-0.29

[1/] S.D. - Standard deviation
[2/] C.I. - 95 percent confidence interval
[3/] NA - Not available

Table A-37.--Riparian analysis means, standard deviation and 95 percent confidence intervals for Upper Bear Valley, 1981.

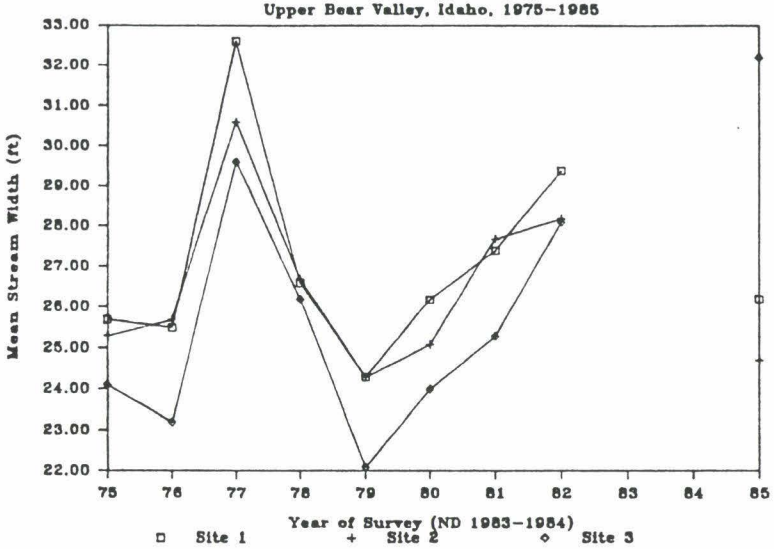
Variable	Site 1			Site 2			Site 3		
	Mean	S.D.[1/]	C.I.[2/]	Mean	S.D.	C.I.	Mean	S.D.	C.I.
Habitat type	13.5	3.8	12.4-14.6	14.4	4.3	13.2-15.5	13.1	5.0	11.9-14.2
Bank cover stability	3.4	0.6	3.2-3.6	3.3	0.6	3.1-3.4	3.2	0.8	3.0-3.4
Stream cover	2.0	0.2	1.8-2.1	2.0	0.6	1.9-2.1	1.9	0.3	1.8-2.0
Bank alteration (percent)									
natural	9	5	8-11	10	3	9-11	12	6	11-14
artificial	36	14	31-41	26	19	21-31	30	23	25-35
total	45	-	-	36	-	-	42	-	-
Vegetation use (percent)	66	9	62-71	18	23	14-23	11	20	7-16
Vegetative overhang (feet)	0.12	0.18	0.03-0.21	0.40	0.50	0.31-0.48	0.20	0.26	0.11-0.29

Table A-38.--Riparian analysis means, standard deviation and 95 percent confidence intervals for Upper Bear Valley, 1982.

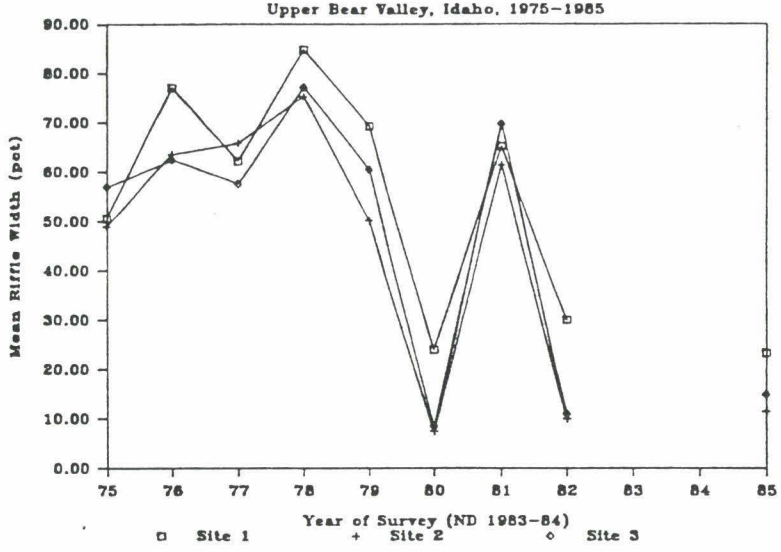
Variable	Site 1			Site 2			Site 3		
	Mean	S.D.[1/]	C.I.[2/]	Mean	S.D.	C.I.	Mean	S.D.	C.I.
Habitat type	15.9	2.9	15.0-16.8	16.1	3.3	15.2-17.0	13.8	4.4	12.8-14.7
Bank cover stability	3.6	0.7	3.4-3.7	3.4	0.6	3.2-3.6	2.9	0.9	2.7-3.1
Stream cover	2.1	0.5	2.0-2.2	1.8	0.4	1.7-2.0	1.8	0.4	1.7-2.0
Bank alteration (percent)									
natural	18	5	16-19	15	7	13-16	10	4	9-11
artificial	14	5	11-16	10	5	7-12	29	14	26-31
total	32	-	-	25	-	-	39	-	-
Vegetation use (percent)	0	1.2	0-2	1	8	0-2	78	6	76-79
Vegetative overhang (feet)	0.38	0.25	0.30-0.45	0.43	0.32	0.35-0.50	0.45	0.33	0.30-0.53

[1/] S.D. - Standard deviation
[2/] C.I. - 95 percent confidence interval

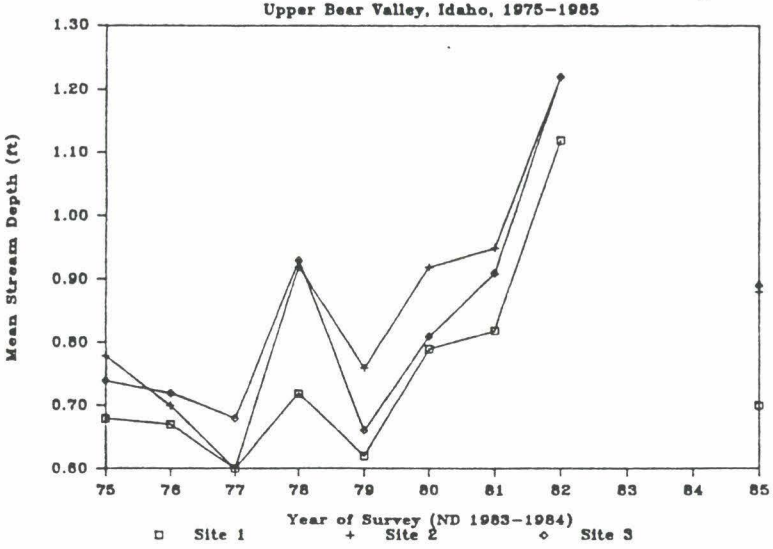
Annual Fluctuations in Mean Width



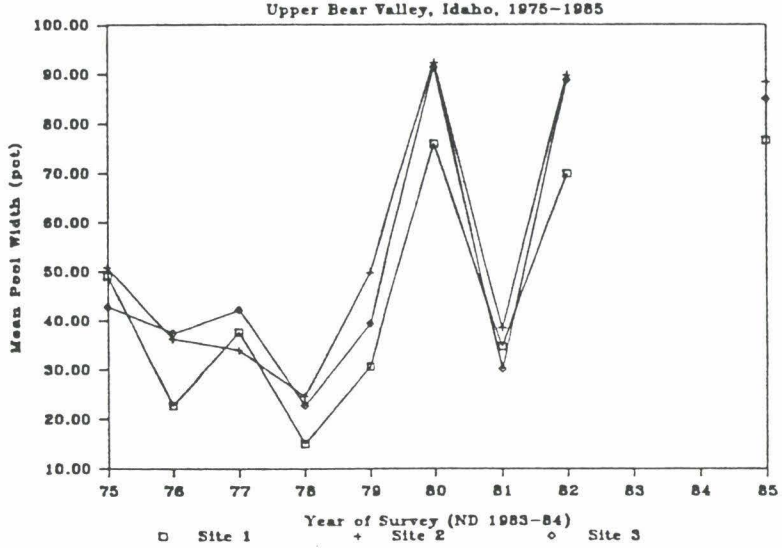
Annual Fluctuations in Riffle Width



Annual Fluctuations in Mean Depth



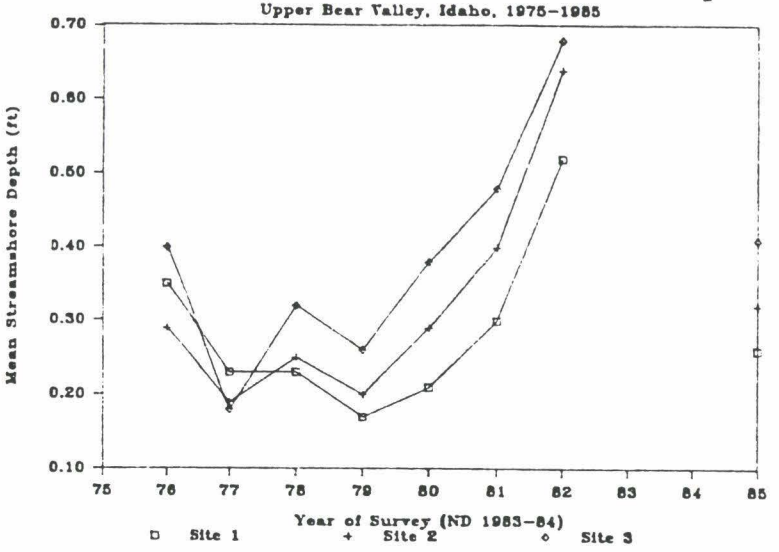
Annual Fluctuations in Pool Width



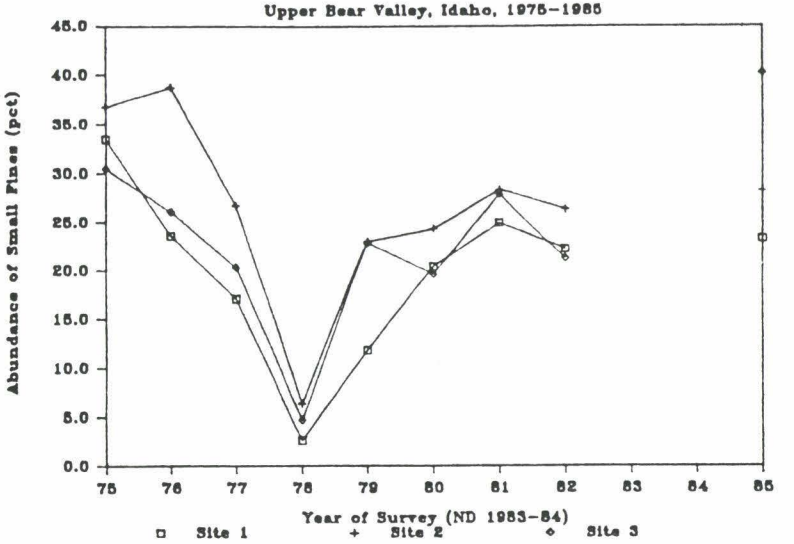
APPENDIX 9

Graphic presentation of fluctuations of geomorphic/aquatic and riparian analysis means over time

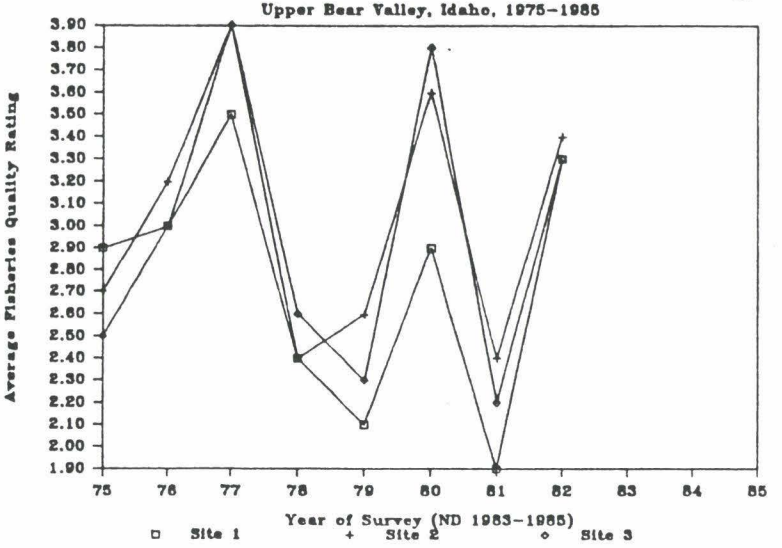
Annual Fluctuations in Shore Depth



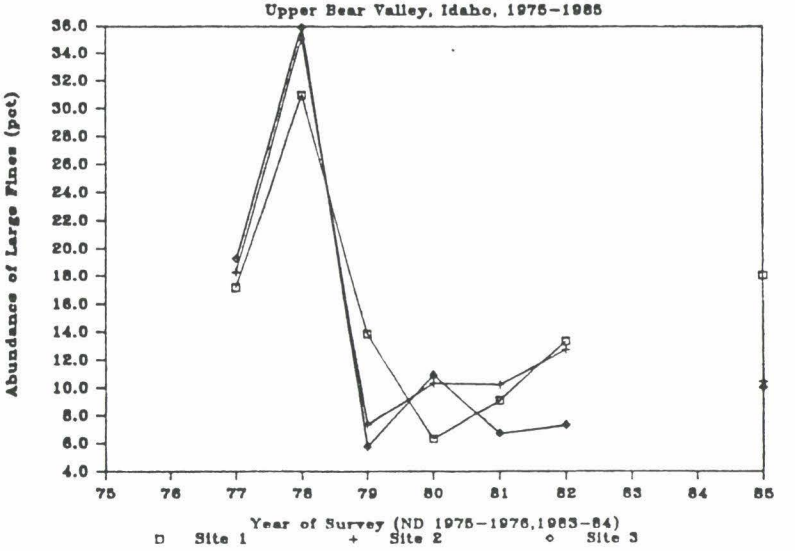
Annual Fluctuations Small Fines



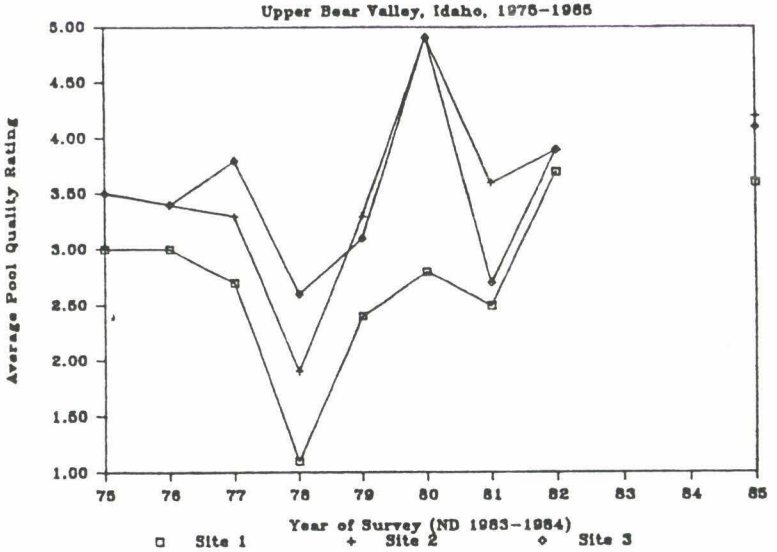
Annual Fluctuations in Fish Rating



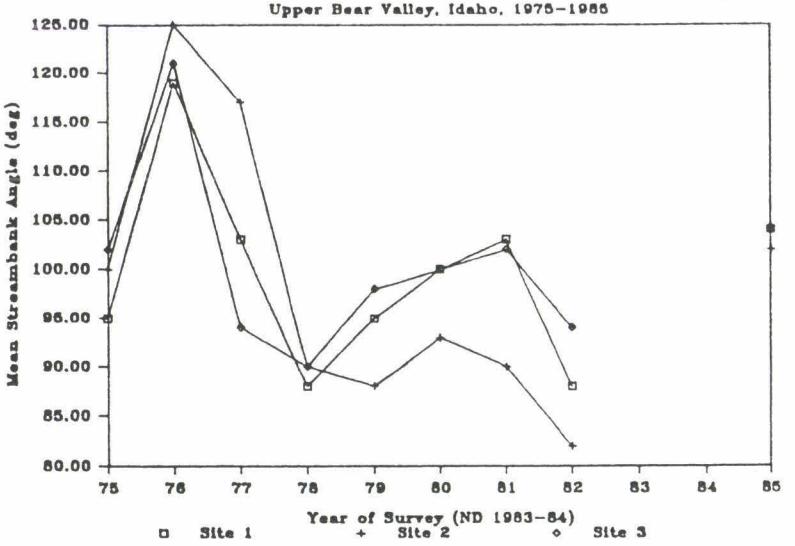
Annual Fluctuations Large Fines



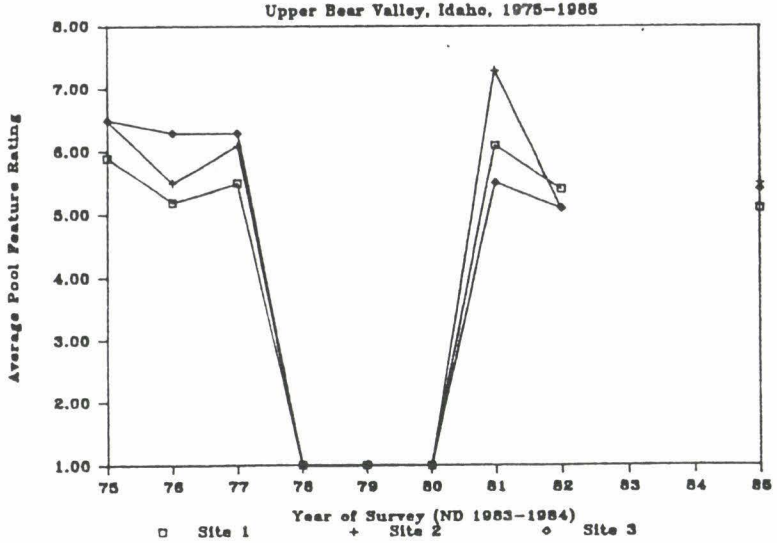
Annual Fluctuations in Pool Quality



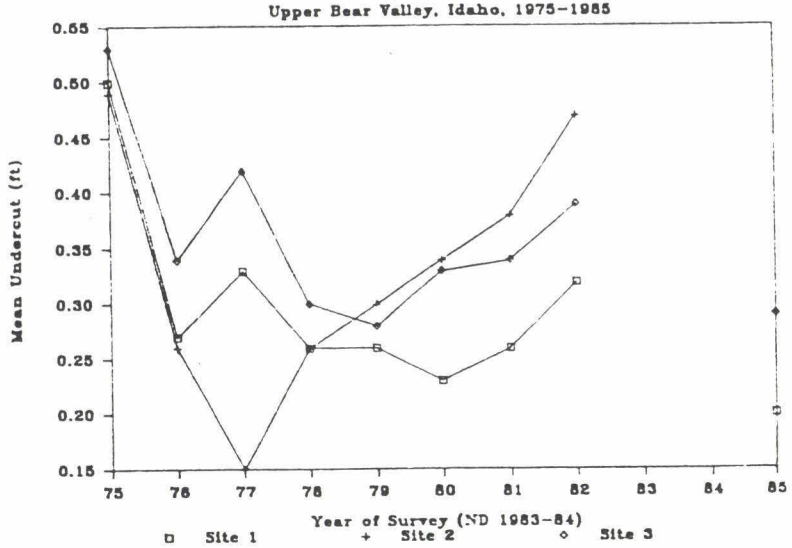
Annual Fluctuations in Bank Angle



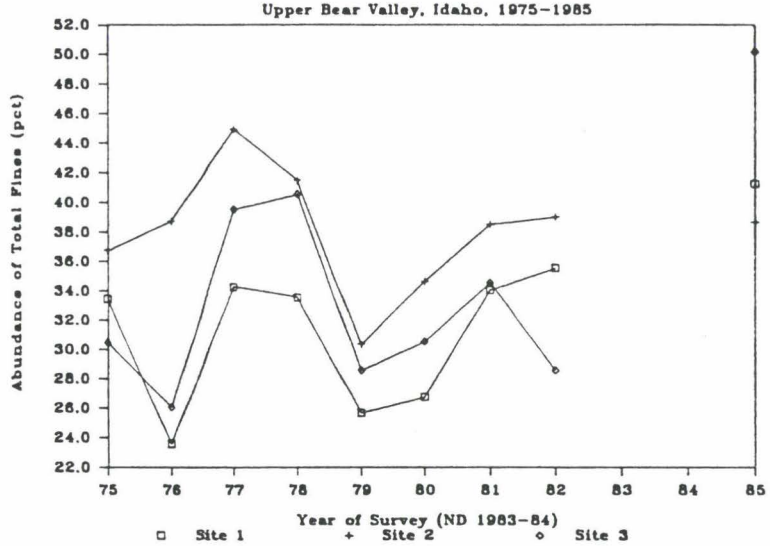
Annual Fluctuations in Pool Feature



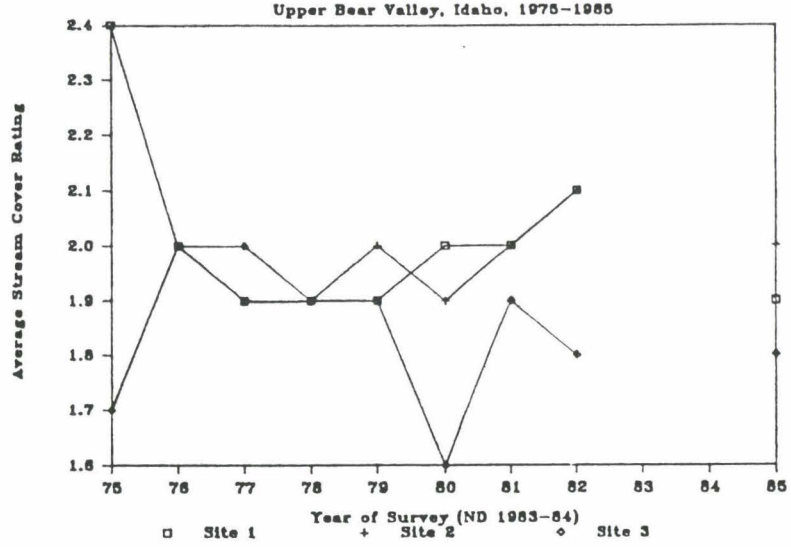
Annual Fluctuations in Undercut



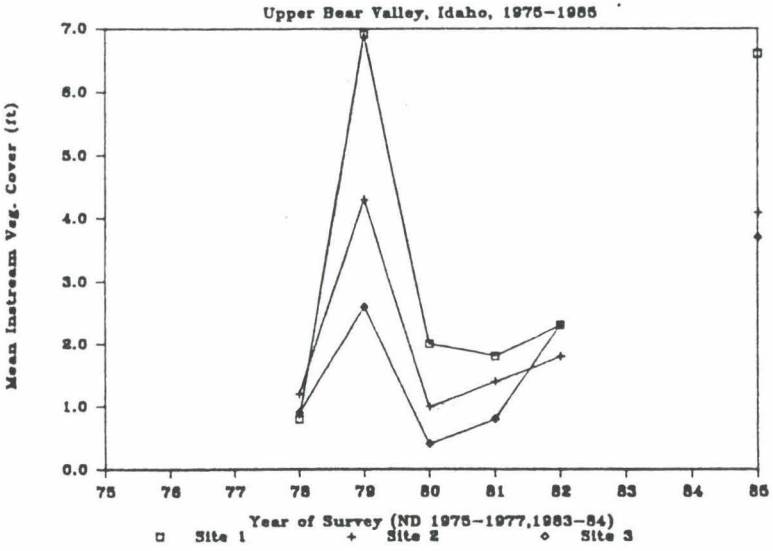
Annual Fluctuations in Total Fines



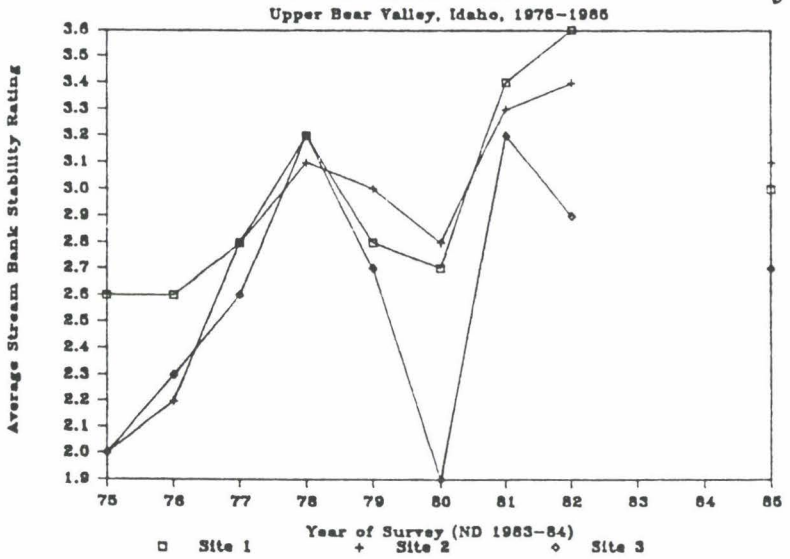
Annual Fluctuations in Stream Cover



Annual Fluctuations in Instream Cover

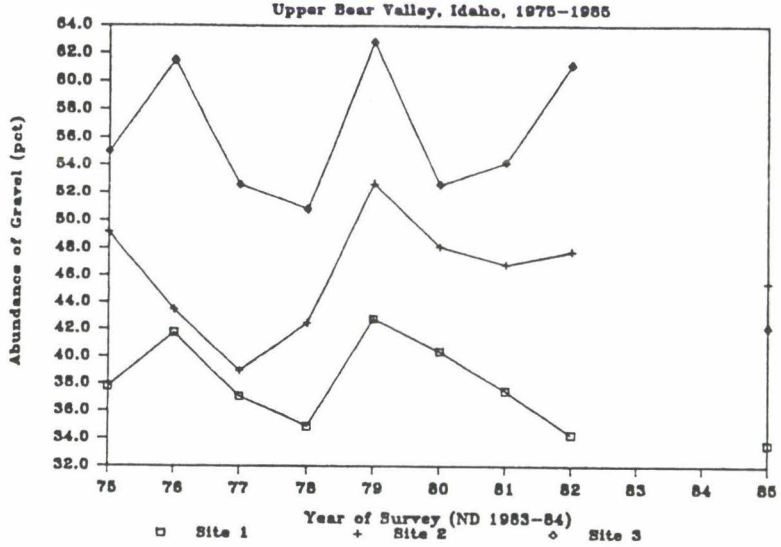


Annual Fluctuations in Bank Stability



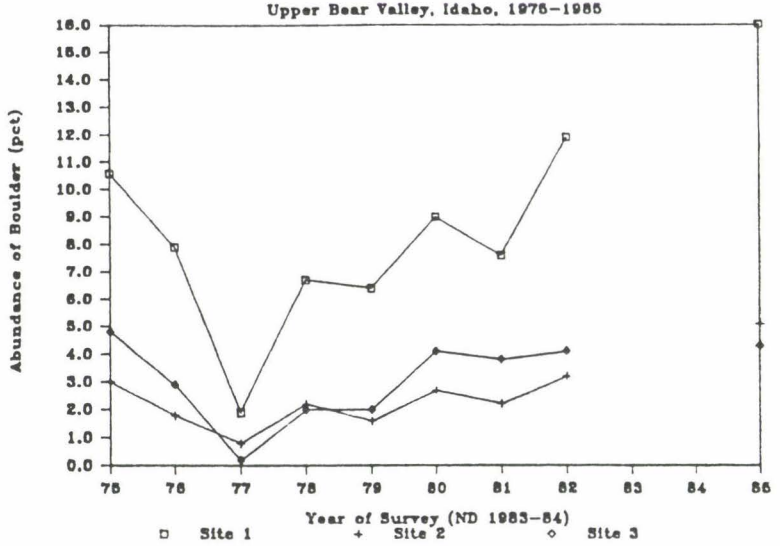
Annual Fluctuations Gravel

Upper Bear Valley, Idaho, 1975–1985



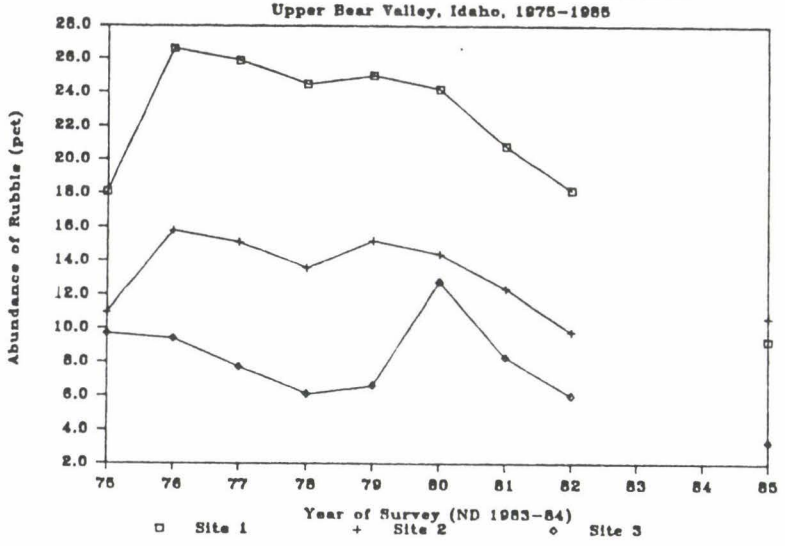
Annual Fluctuations in Boulder

Upper Bear Valley, Idaho, 1975–1985



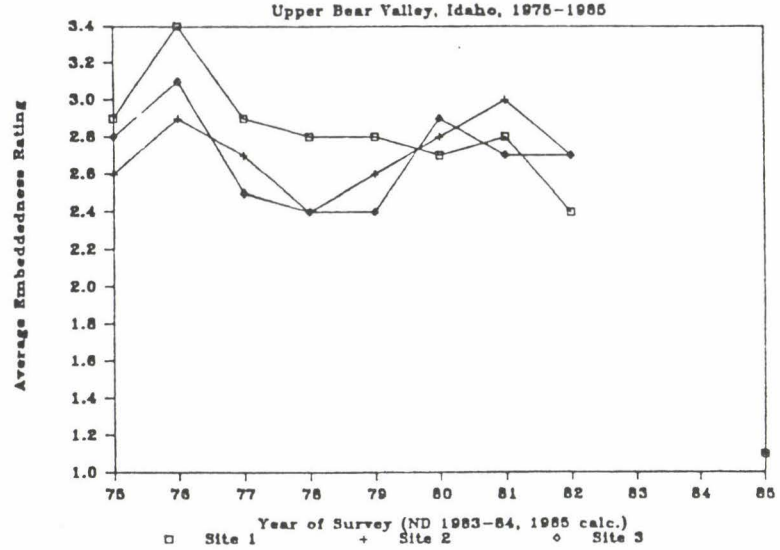
Annual Fluctuations Rubble

Upper Bear Valley, Idaho, 1975–1985



Annual Fluctuations in Embeddedness

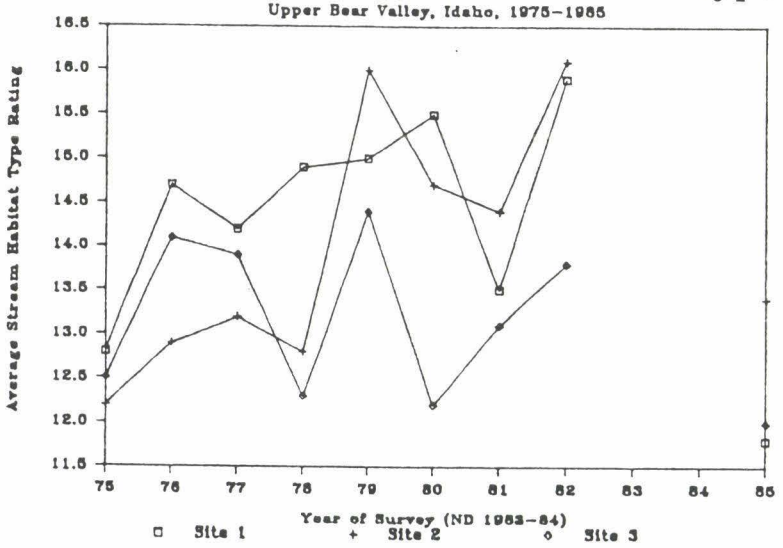
Upper Bear Valley, Idaho, 1975–1985



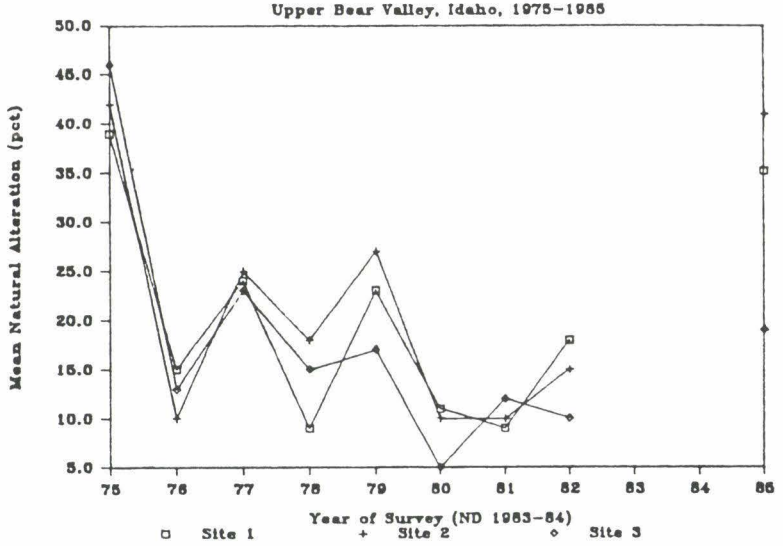
APPENDIX 10

Annual fish population analysis results for Upper Bear Valley.

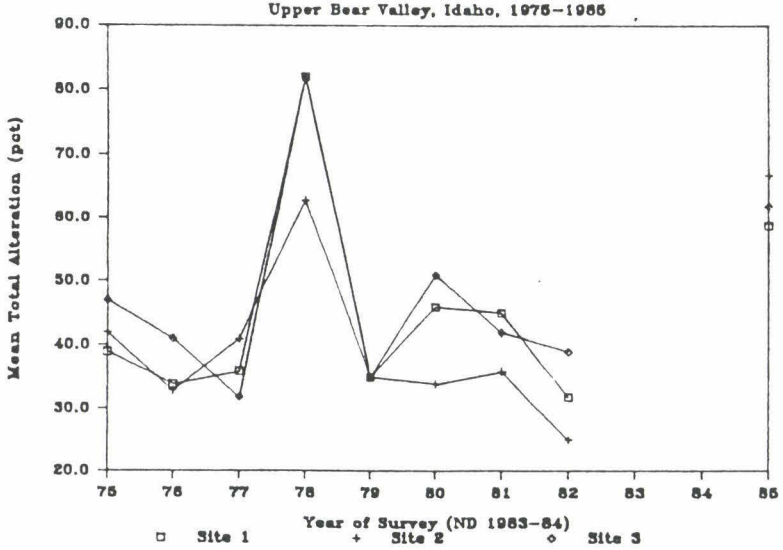
Annual Fluctuations in Habitat Type



Annual Fluctuations in Nat. Alteration



Annual Fluctuations in Total Alteration



Annual Fluctuations in Art. Alteration

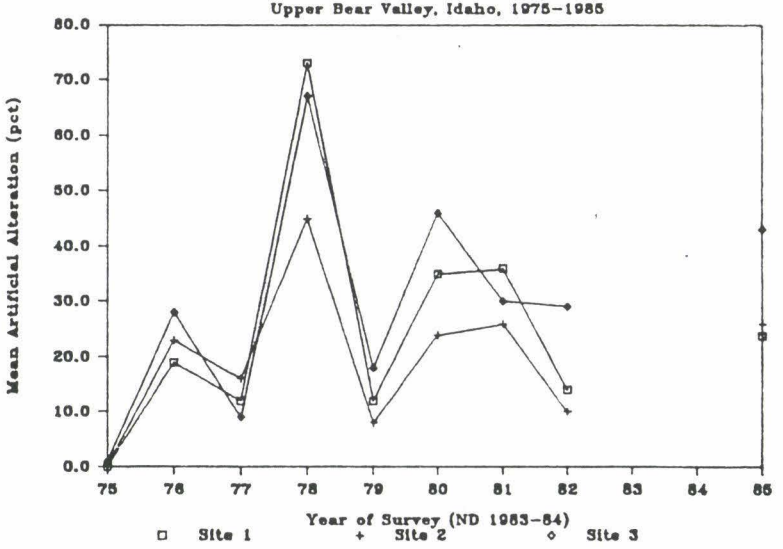
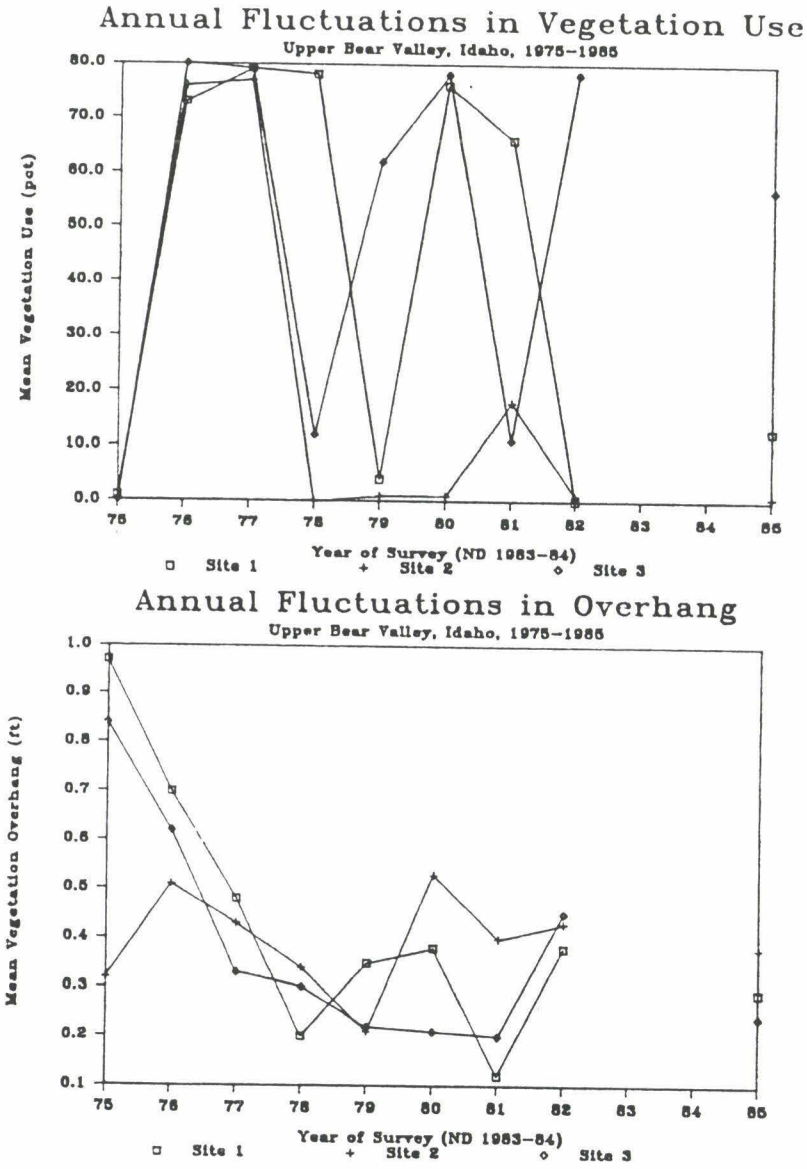


Table A-38.--Fish population analysis results, Upper Bear Valley, 1976.

SPECIES/STUDY SITE	Total catch	Population est. Number	95% C.I.	Mean length Inches (95% C.I.)	mm(95% C.I.)	Mean weight Ounces (95% C.I.)	gm (95% C.I.)
Chinook Salmon							
Site 1	28	28	28-36	2.59(2.20-2.98)	65.8(56.0-75.6)	0.22(0.09-0.35)	6.2(2.6-9.8)
Site 2	30	30	30-41	2.29(2.16-2.42)	58.1(54.8-61.5)	0.10(0.08-0.02)	2.8(2.3-3.4)
Site 3	2	2	2-2	2.87(0.00-9.88)	72.0(- 250.9)	0.13(0.00-1.14)	3.8(- 32.3)
Overall	60	60	60-73	2.45(2.26-2.64)	62.2(57.4-67.0)	0.16(0.10-0.22)	4.4(2.8-6.1)
Rainbow Trout							
Site 1	2	2	2-15	3.76(0.00-28.52)	95.5(- 724.5)	0.64(0.00-25.55)	18.1(- 169.9)
Site 2	4	4	4-6	5.00(0.74-9.26)	127.0(18.7-235.3)	1.23(0.00-3.44)	34.8(- 97.5)
Site 3	3	3	3-11	2.93(2.39-3.47)	74.3(60.7-88.0)	0.12(0.00-0.25)	3.4(- 7.0)
Overall	9	11	9-22	4.03(2.38-5.68)	102.4(60.6-144.3)	0.73(0.00-1.51)	20.6(- 42.8)
Eastern Brook Char							
Site 1	11	11	11-18	5.38(4.12-6.64)	136.6(104.6-168.4)	1.61(0.57-2.64)	45.2(16.3-74.1)
Site 2	12	13	12-19	4.85(4.11-5.59)	123.3(104.4-142.1)	0.75(0.45-1.05)	21.3(12.9-29.7)
Site 3	-	-	-	-	-	-	-
Overall	22	56	23-200	5.10(4.44-5.77)	129.7(112.8-146.5)	1.15(0.65-1.65)	32.7(18.5-46.9)
Bull Trout							
Site 1	4	4	4-9	5.86(5.17-6.60)	149.5(131.3-167.7)	0.04(0.04-1.37)	32.1(25.4-38.9)
Site 2	3	3	3-3	6.17(5.60-6.73)	156.7(142.3-171.0)	1.24(1.07-1.41)	35.2(30.5-39.9)
Site 3	4	4	4-6	5.55(1.46-9.64)	141.0(37.0-245.0)	1.09(0.00-2.21)	31.0(- 62.7)
Overall	11	1	11-14	5.84(4.86-6.82)	148.4(123.5-173.2)	1.15(0.88-1.42)	32.0(24.9-40.2)
Sculpin							
Site 1	288	288	288-317	2.33(2.26-2.40)	59.2(57.4-61.0)	0.15(0.14-0.17)	4.4(4.0-4.8)
Site 2	218	448	218-707	2.41(2.33-2.49)	61.3(59.3-63.3)	0.16(0.13-0.16)	4.1(3.8-4.5)
Site 3	143	188	144-232	2.41(2.31-2.51)	61.2(58.7-63.7)	0.14(0.12-0.15)	3.9(3.5-4.3)
Overall	649	649	649-683	2.38(2.33-2.42)	60.4(59.2-61.5)	0.15(0.14-0.16)	4.2(4.0-4.4)
Whitefish							
Site 1	0	-	-	- (0.00-5.00)	-	-	-
Site 2	1	-	-	2.13(0.00-0.00)	54.0(-)	0.05(0.00-0.00)	1.5(-)
Site 3	1	-	-	2.56(0.00-0.00)	65.0(-)	0.05(0.00-0.00)	1.3(-)
Overall	2	359	-	2.34(0.00-5.09)	59.5(-)	0.05(0.00-0.09)	1.4(.1-2.7)

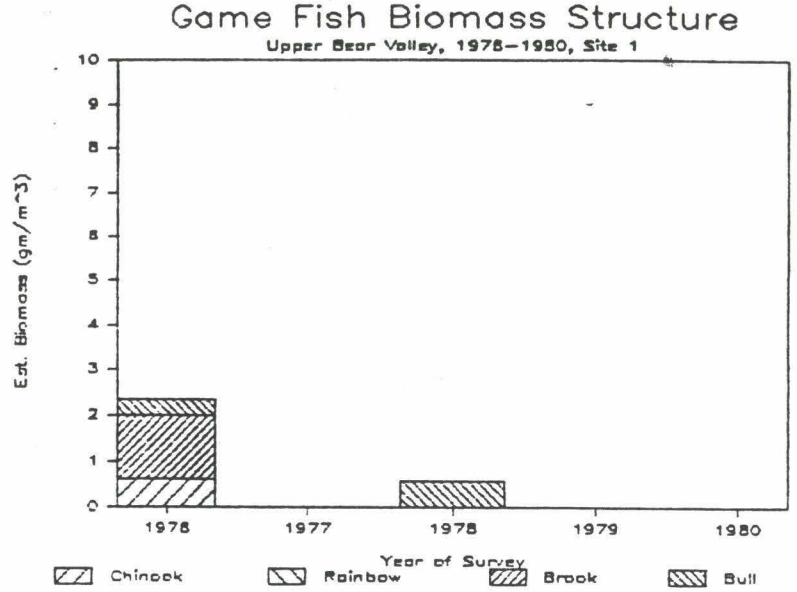

Annual Fluctuations in Vegetation Use
Upper Bear Valley, Idaho, 1975-1985
Mean Vegetation Use (pct)
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
75
76
77
78
79
80
81
82
83
84
85
Year of Survey (ND 1983-84)
Site 1
Site 2
Site 3
Annual Fluctuations in Overhang
Upper Bear Valley, Idaho, 1975-1985
Mean Vegetation Overhang (ft)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
75
76
77
78
79
80
81
82
83
84
85
Year of Survey (ND 1983-84)
Site 1
Site 2
Site 3

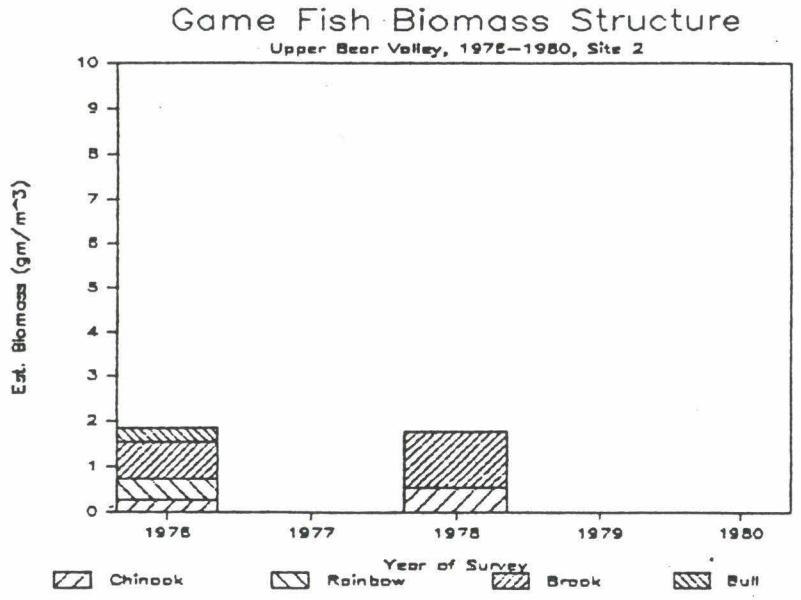
APPENDIX 11

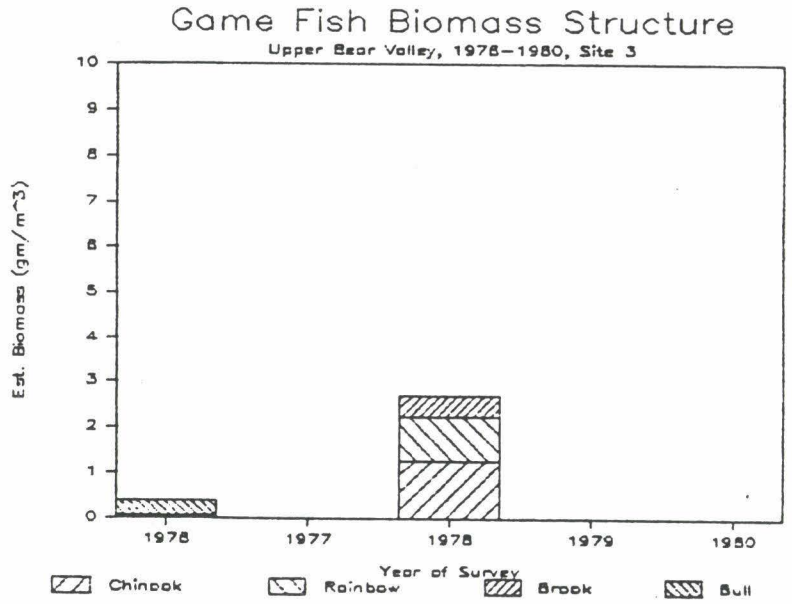
Supplemental fish population analysis graphs for Upper Bear Valley.

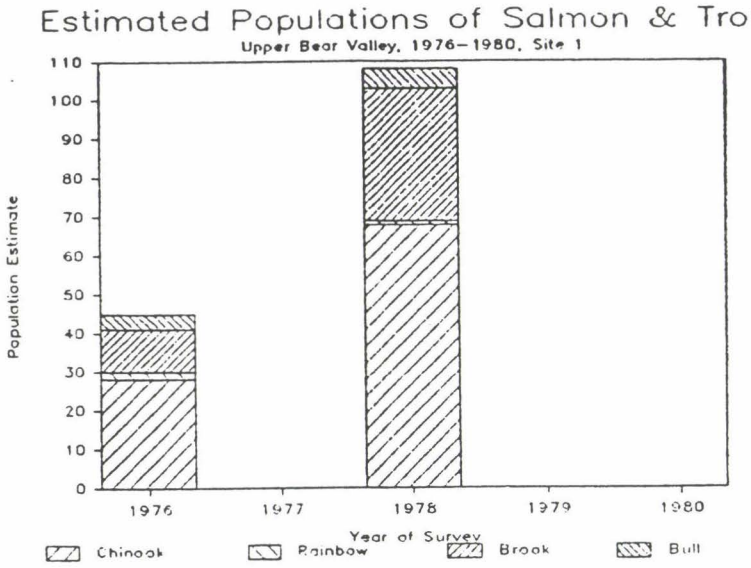
Table A-39.--Fish population analysis results, Upper Bear Valley, 1978.

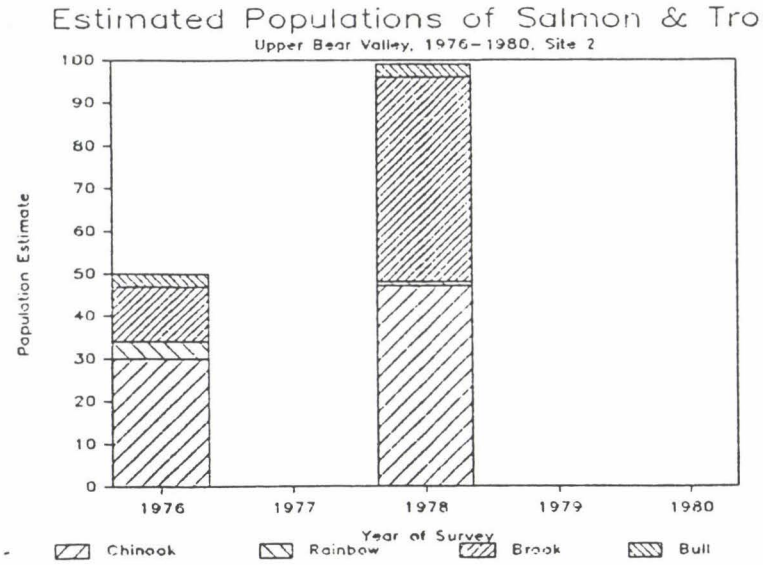
SPECIES/STUDY SITE	Total catch	Population est. Number	95% C.I.	Mean length Inches (95% C.I.)	mm(95% C.I.)	Mean weight Ounces (95% C.I.)	gm (95% C.I.)
Chinook Salmon							
Site 1	67	68	67-71	2.37(2.24-2.50)	60.2(56.9-63.5)	0.11(0.09-0.14)	3.1(2.4-3.9)
Site 2	46	47	46-50	2.56(2.32-2.79)	65.0(59.0-70.9)	0,17(0.02-0.24)	4.7(2.6-6.9)
Site 3	145	146	145-149	2.42(2.38-2.46)	61.5(60.5-62.5)	0.13(0.12-0.14)	3.6(3.4-3.9)
Overall	258	262	258-267	2.43(2.37-2.49)	61.8(60.3-63.3)		3.7(3.3-4.2)
Rainbow Trout							
Site 1	1	-	-	2.83(0.00-0.00)	148.0(0.0-0.0)	1.41(0.00-0.00)	40.4(0.0-0.0)
Site 2	1	-	-	7.20(0.00-0.00)	183.0(0.0-0.0)	2.62(0.00-0.00)	74.4(0.0-0.0)
Site 3	8	8	8-9	5.82(4.22-7.42)	147.9(107.3-188.5)	1.76(0.00-3.57)	50.0(0.0-101.2)
Overall	10	10	10-11	5.96(4.71-7.21)	151.4(119.8-183.0)	1.82(0.44-3.20)	51.5(12.4-90.6)
Eastern Brook Char							
Site 1	34	34	34-46	2.70(2.08-3.32)	68.5(52.7-84.3)	0.41(0.12-0.71)	11.7(3.4-20.1)
Site 2	48	48	48-49	2.66(2.17-3.15)	67.7(55.2-80.1)	0.36(0.12-0.61)	10.3(3.3-17.3)
Site 3	72	72	72-74	1.94(1.80-0.12)	49.4(45.7-53.1)	0.09(0.06-0.13)	2.6(1.6-3.6)
Overall	154	155	154-158	2.06(2.11-2.56)	59.3(53.6-64.9)	0.25(0.14-0.35)	7.0(4.1-10.0)
Bull Trout							
Site 1	5	5	5-6	7.20(3.53-10.87)	182.8(89.5-276.1)	1.40(0.47-2.32)	39.6(13.4-65.8)
Site 2	3	3	3-4	5.18(0.00-12.67)	131.7(- 321.8)	1.22(0.00-3.79)	34.6(0 107.5)
Site 3	10	10	10-11	2.68(1.60-3.76)	68.1(40.6-95.6)	0.29(0.00-0.66)	8.1(- 18.6)
Overall	18	18	18-19	4.35(2.90-5.80)	110.6(73.8-147.3)	0.75(0.34-1.16)	21.3(9.6-33.0)
Sculpin							
Site 1	1903	1967	(1946-1988)	-	-	0.04(0.04-0.04)	1.1(1.0-1.2)
Site 2	1666	1677	(1669-1685)	-	-	0.05(0.05-0.05)	1.4(1.3-1.5)
Site 3	2583	2610	2598-2622	-	-	0.05(0.05-0.05)	1.3(1.3-1.4)
Overall	6152	6242	6220-6264	-	-	0.05(0.04-0.05)	1.3(1.2-1.3)
Whitefish							
Site 1	18	19	18-23	2.89(1.34-4.43)	73.3(34.0-112.6)	0.98(0.00-2.32)	27.7(- 65.7)
Site 2	3	3	3-6	3.74(0.00-7.81)	95.0(- 198.3)	0.37(0.00-1.48)	10.6(- 42.2)
Site 3	34	35	34-39	2.46(2.16-2.77)	62.5(54.7-70.3)	0.14(0.08-0.19)	3.8(2.4-5.3)
Overall	55	59	55-66	2.67(2.16-3.18)	67.8(54.0-80.8)	0.42(0.01-0.84)	12.0(0.3-23.8)

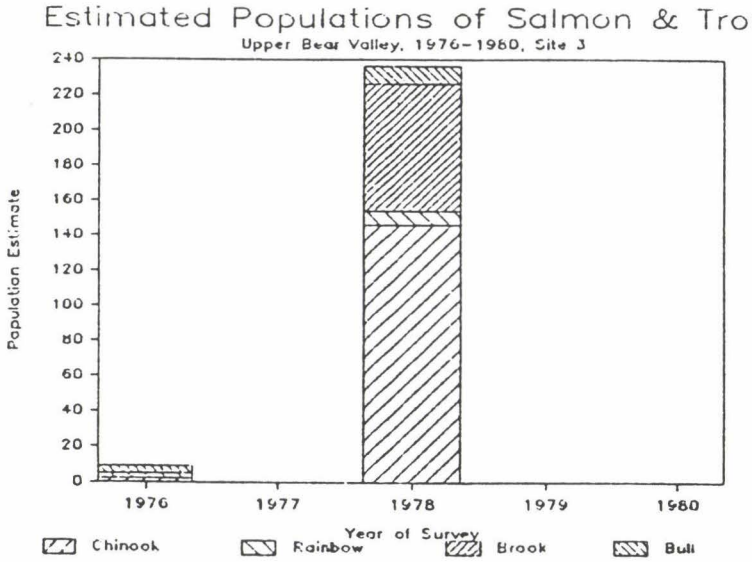

Game Fish Biomass Structure
Upper Bear Valley, 1978–1980, Site 1
Est. Biomass (gm/m^3)
0
1
2
3
4
5
6
7
8
9
10
1976
1977
1978
1979
1980
Year of Survey
Chinook
Rainbow
Brook
Bull

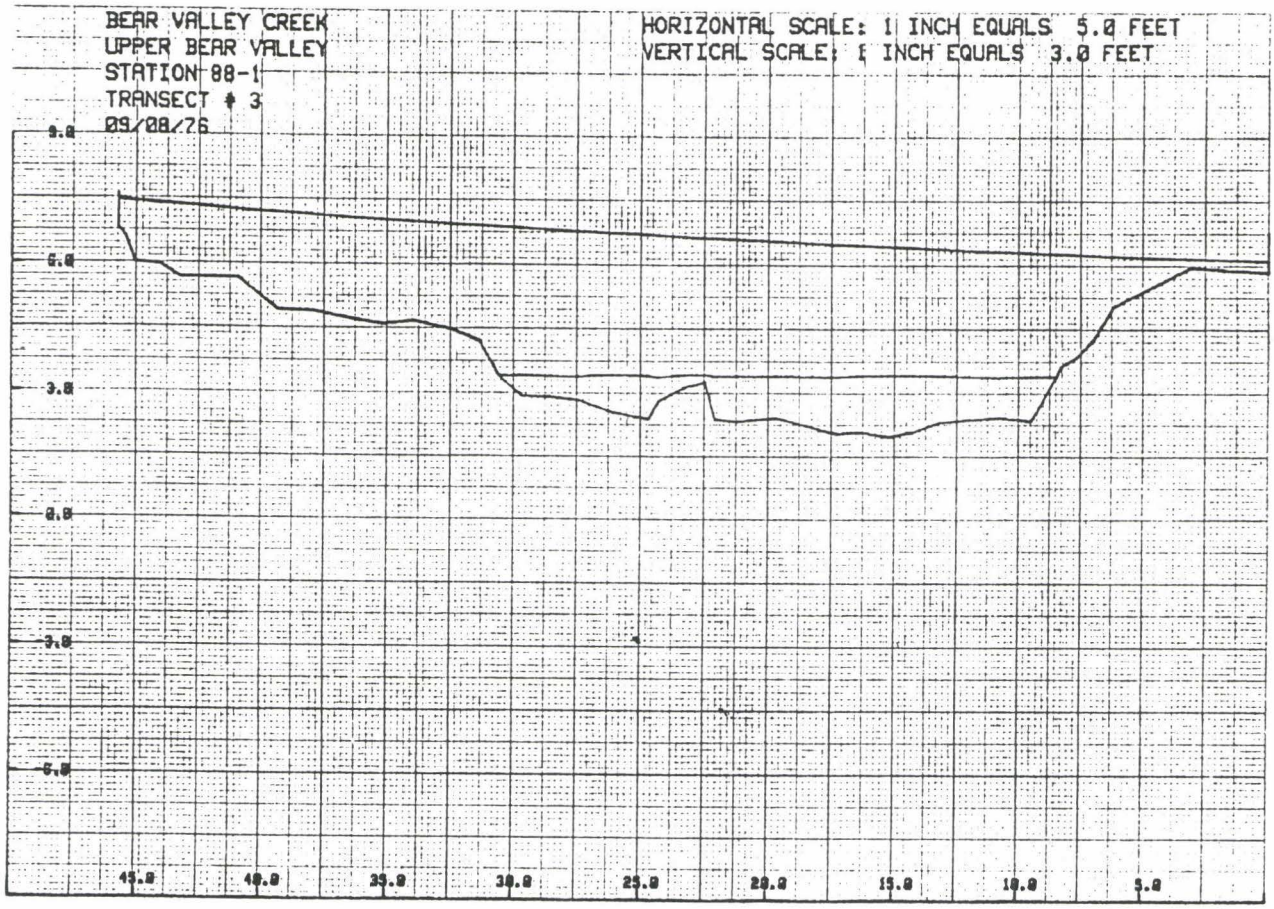

Game Fish Biomass Structure
Upper Bear Valley, 1978–1980, Site 2
Est. Biomass (gm/m^3)
0
1
2
3
4
5
6
7
8
9
10
1976
1977
1978
1979
1980
Year of Survey
Chinook
Rainbow
Brook
Bull

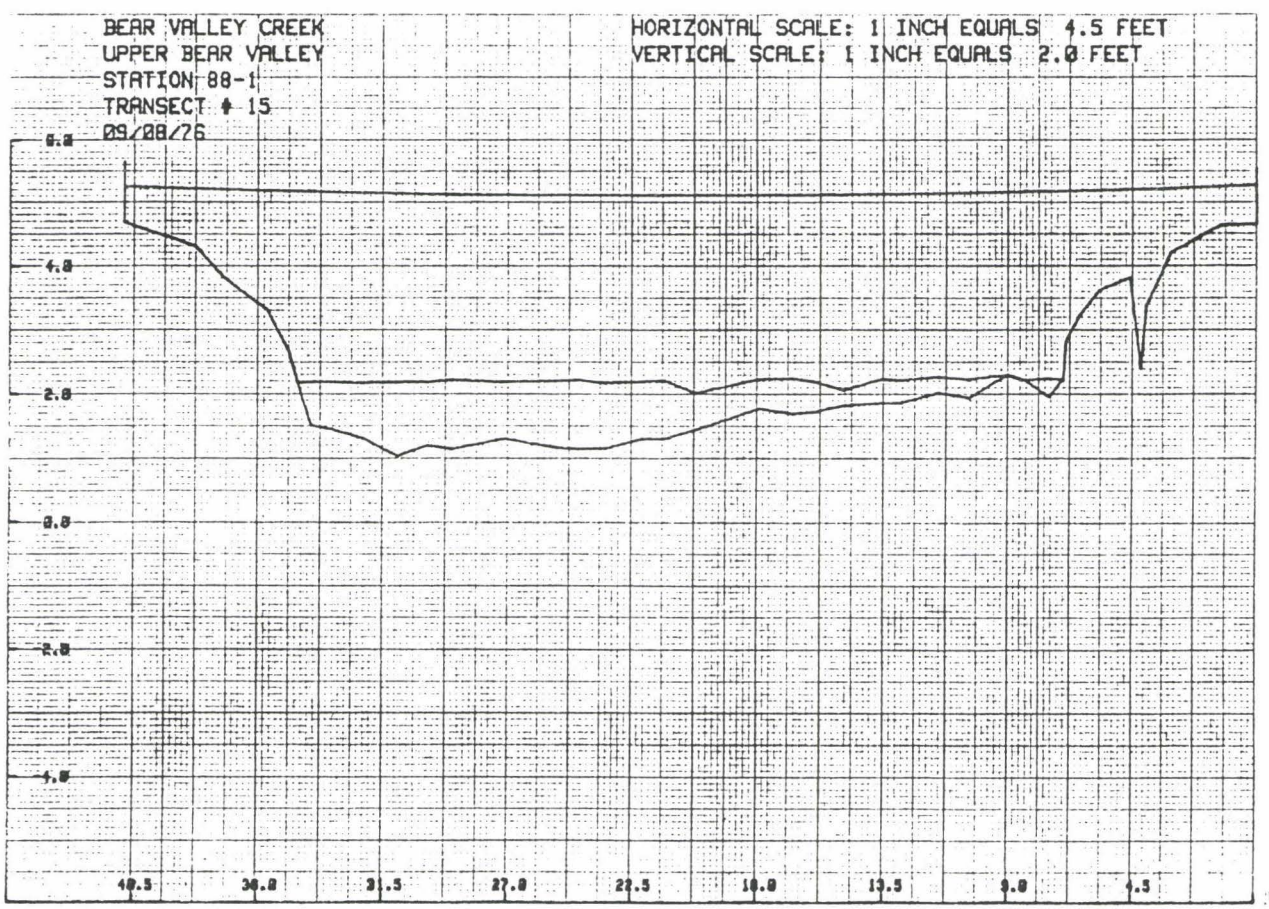

Game Fish Biomass Structure
Upper Bear Valley, 1978–1980, Site 3
Est. Biomass (gm/m^3)
0
1
2
3
4
5
6
7
8
9
10
1976
1977
1978
1979
1980
Year of Survey
Chinook
Rainbow
Brook
Bull


Estimated Populations of Salmon & Trout
Upper Bear Valley, 1976–1980, Site 1
Population Estimate
0
10
20
30
40
50
60
70
80
90
100
110
1976
1977
1978
1979
1980
Year of Survey
Chinook
Rainbow
Brook
Bull


Estimated Populations of Salmon & Trout
Upper Bear Valley, 1976–1980, Site 2
Population Estimate
0
10
20
30
40
50
60
70
80
90
100
1976
1977
1978
1979
1980
Year of Survey
Chinook
Rainbow
Brook
Bull

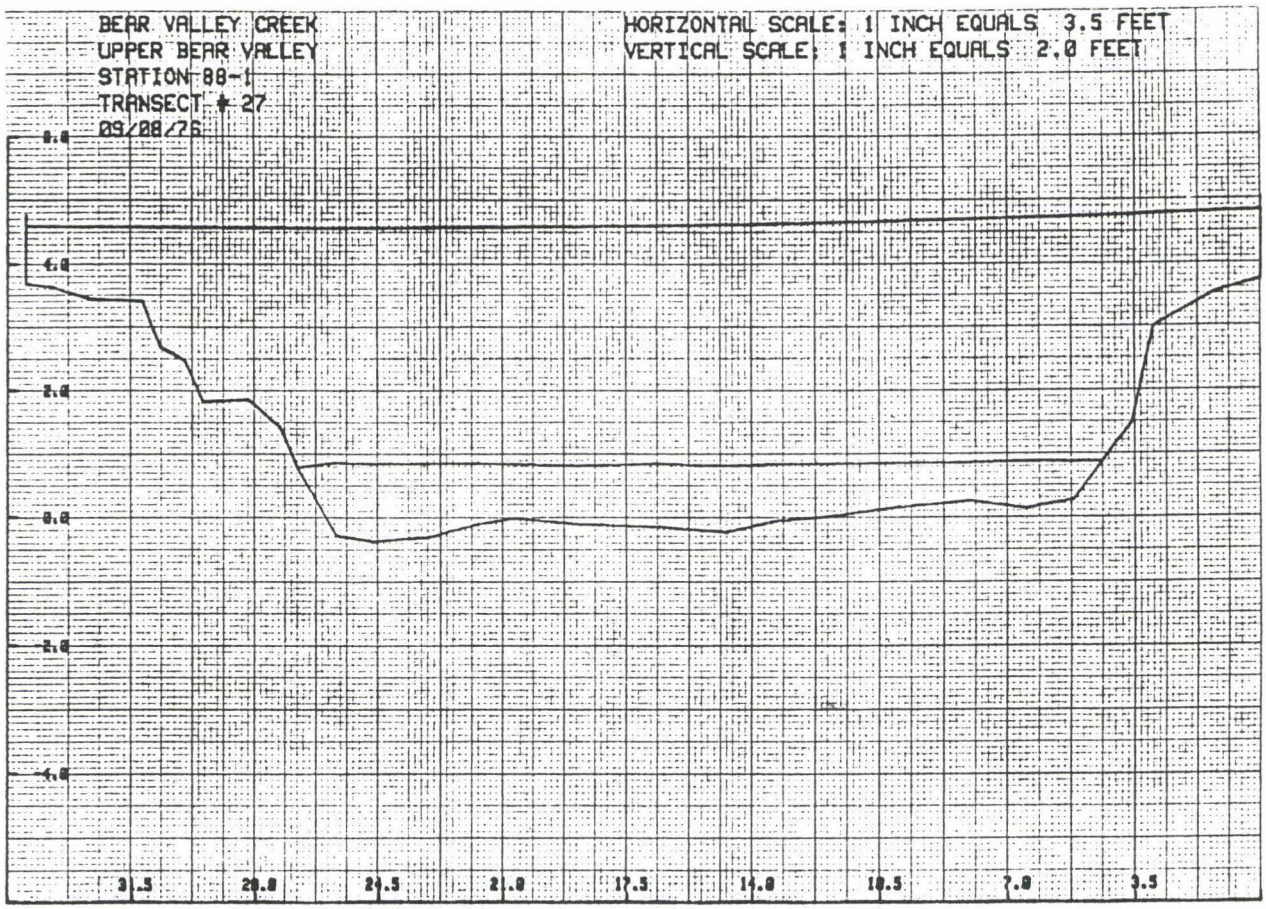

Estimated Populations of Salmon & Trout
Upper Bear Valley, 1976–1980, Site 3
Population Estimate
0
20
40
60
80
100
120
140
160
180
200
220
240
1976
1977
1978
1979
1980
Year of Survey
Chinook
Rainbow
Brook
Bull

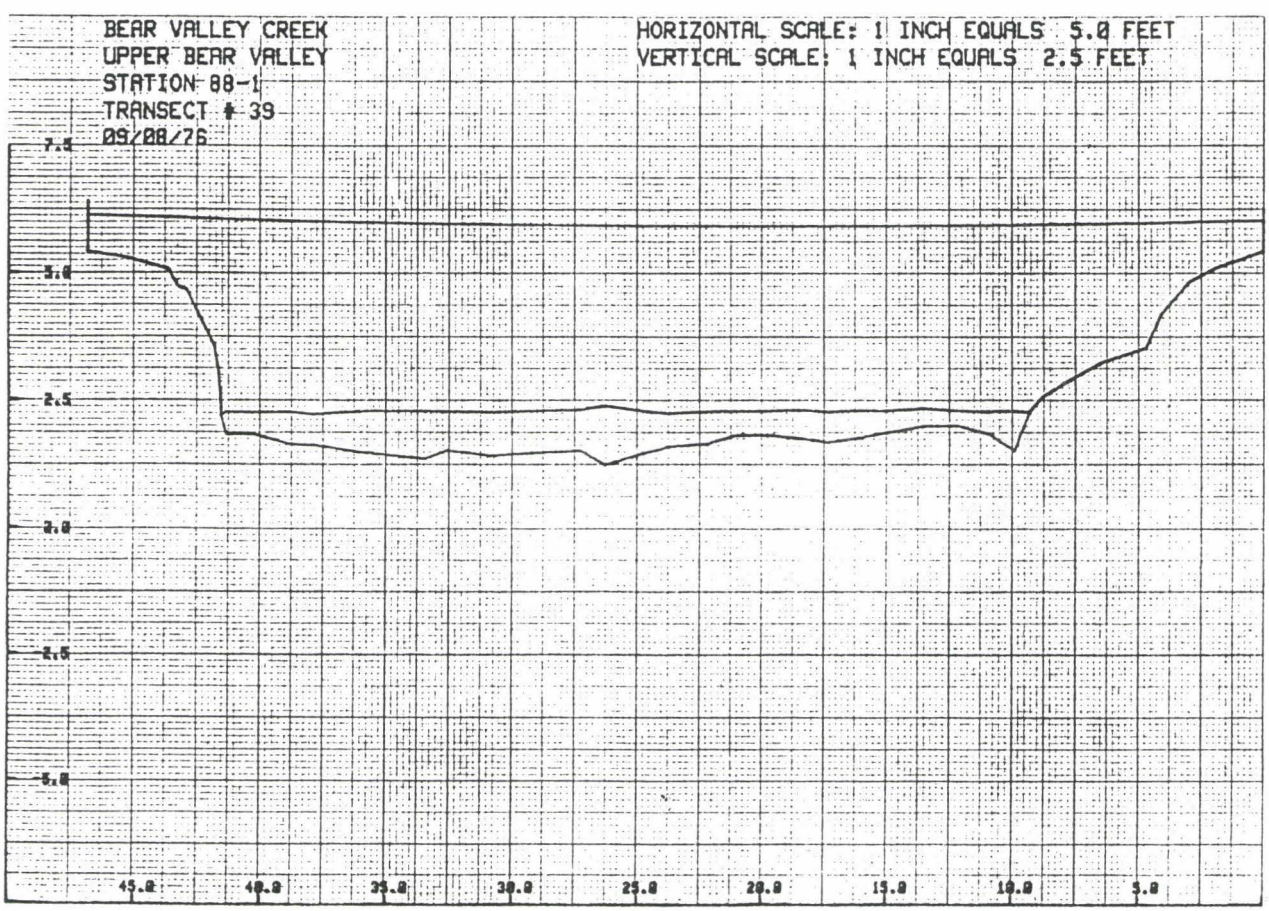

BEAR VALLEY CREEK
UPPER BEAR VALLEY
STATION 88-1
TRANSECT # 3
09/08/76
HORIZONTAL SCALE: 1 INCH EQUALS 5.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 3.0 FEET
9.0
6.0
3.0
0.0
-3.0
-6.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0

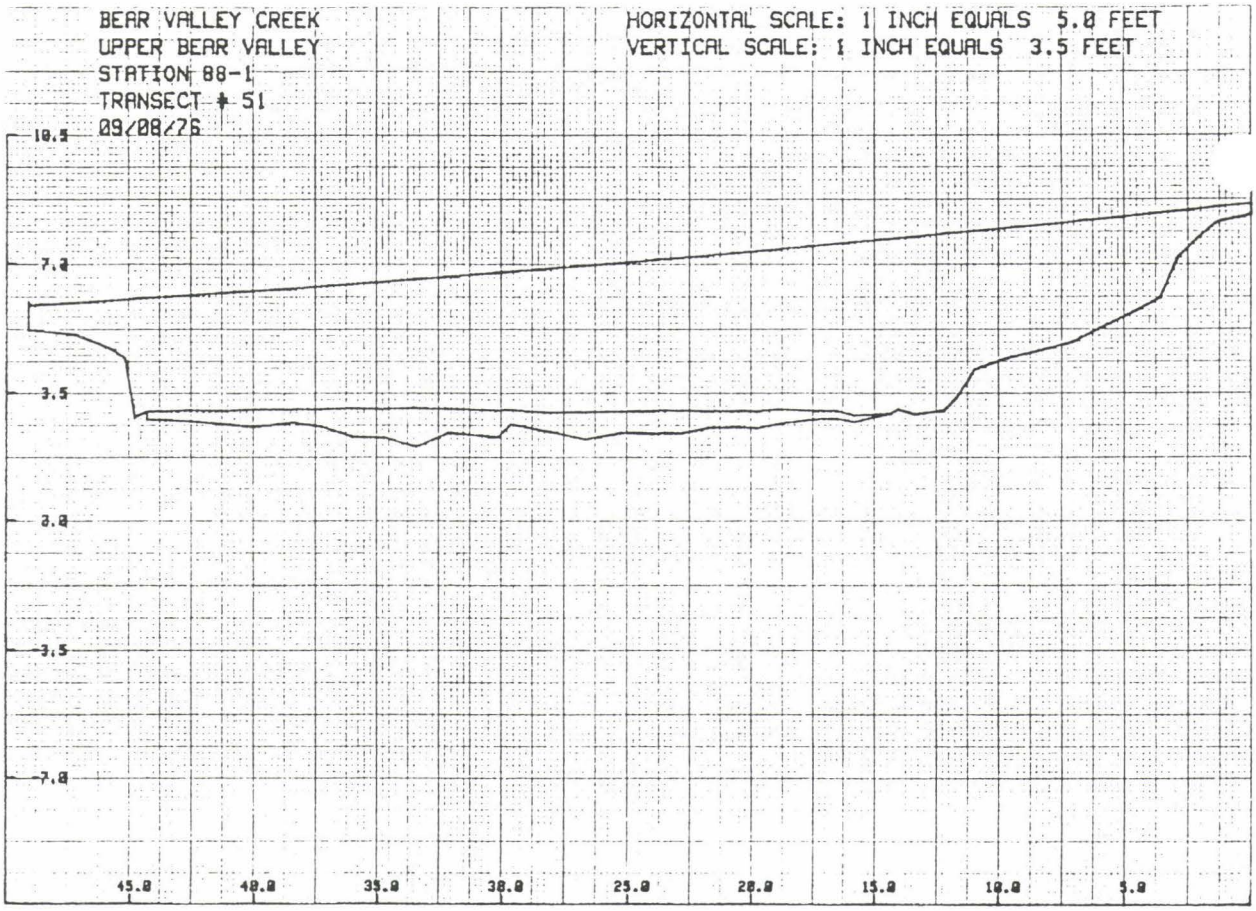

BEAR VALLEY CREEK
UPPER BEAR VALLEY
STATION 88-1
TRANSECT # 15
09/08/76
HORIZONTAL SCALE: 1 INCH EQUALS 4.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
40.5
36.0
31.5
27.0
22.5
18.0
13.5
9.0
4.5

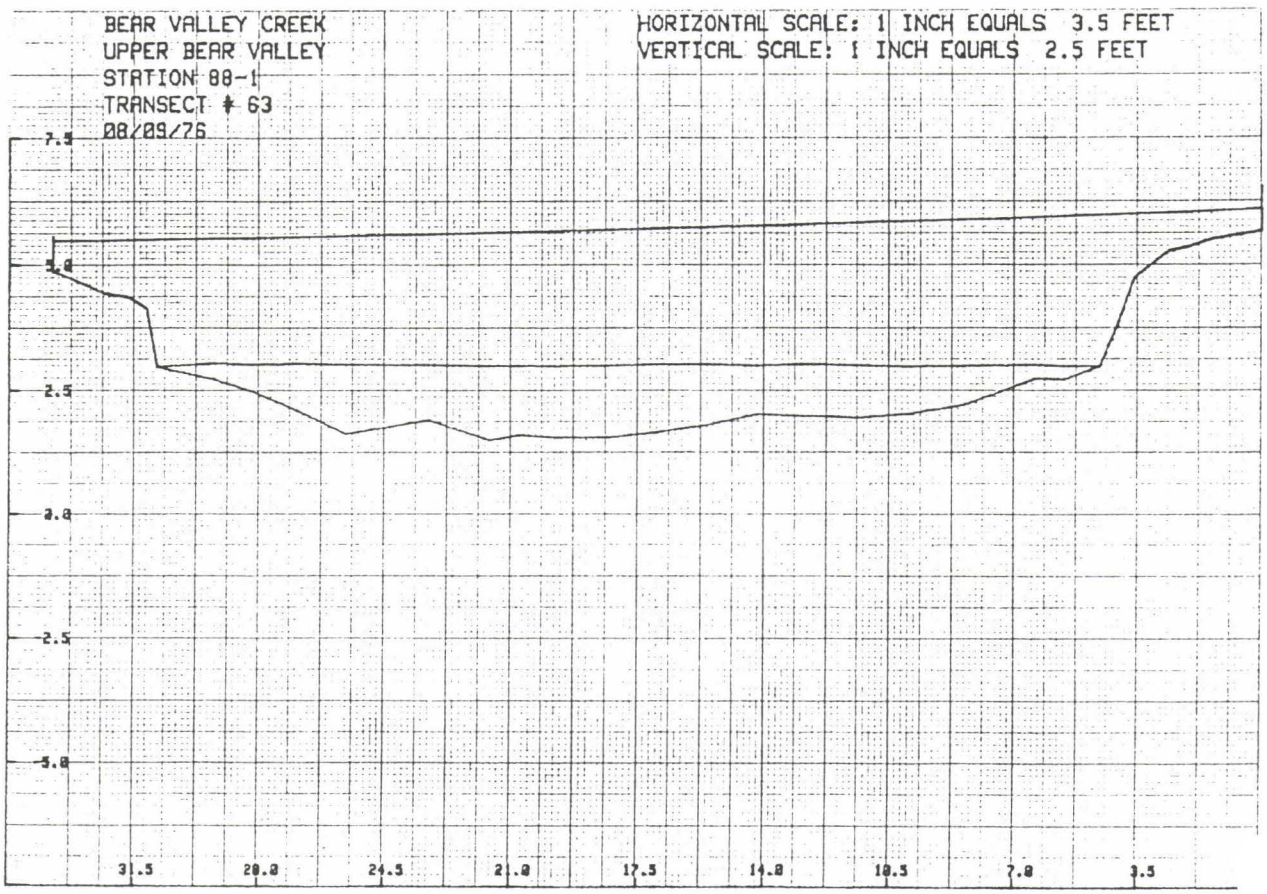
APPENDIX 12

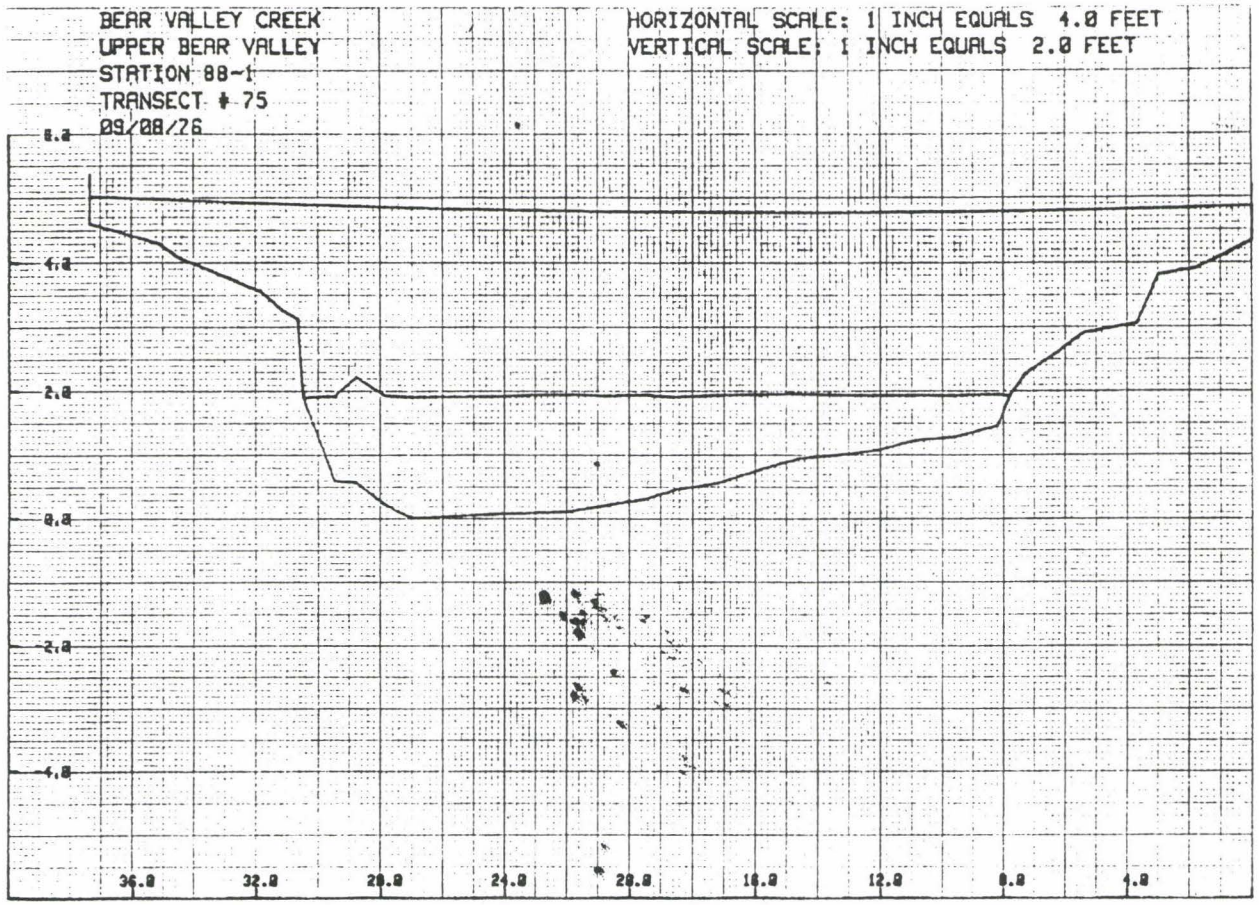
Hydrologic cross section profiles,
Upper Bear Valley, Idaho, 1976 and 1978.

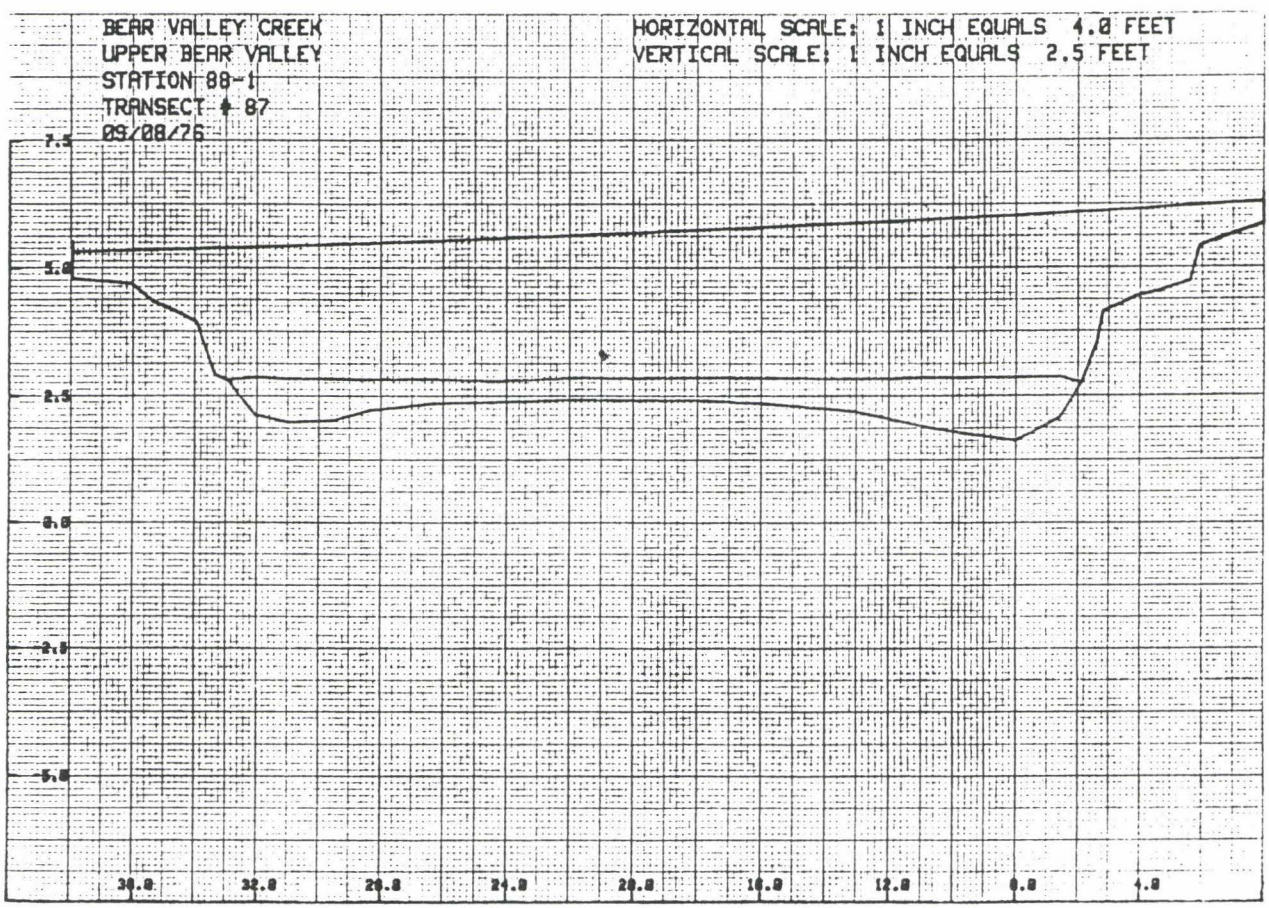

BEAR VALLEY CREEK
UPPER BEAR VALLEY
STATION 88-1
TRANSECT # 27
09/08/76
HORIZONTAL SCALE: 1 INCH EQUALS 3.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
31.5
28.0
24.5
21.0
17.5
14.0
10.5
7.0
3.5

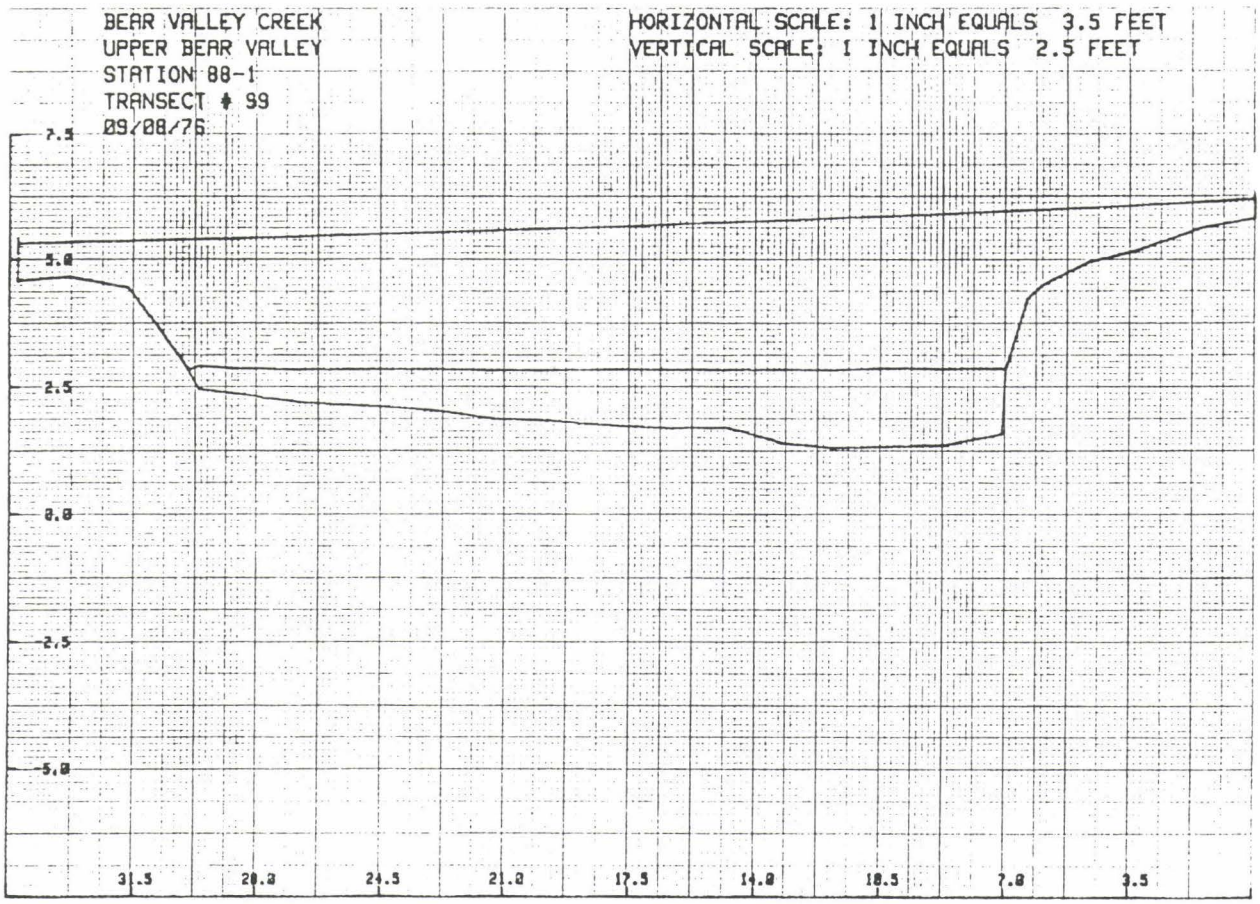

BEAR VALLEY CREEK
UPPER BEAR VALLEY
STATION 88-1
TRANSECT # 39
09/08/76
HORIZONTAL SCALE: 1 INCH EQUALS 5.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0

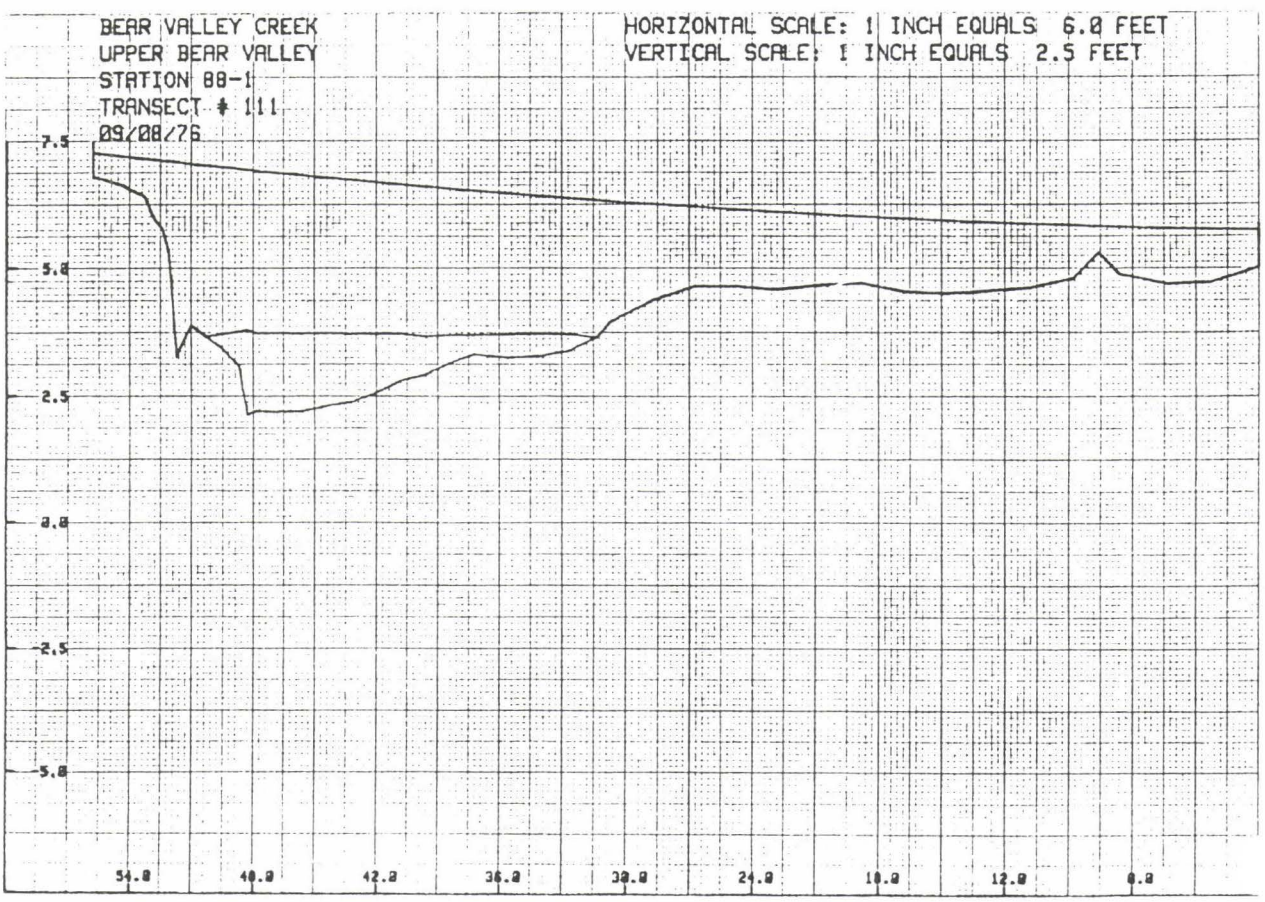

BEAR VALLEY CREEK
UPPER BEAR VALLEY
STATION 88-1
TRANSECT # 51
09/08/76
HORIZONTAL SCALE: 1 INCH EQUALS 5.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 3.5 FEET
10.5
7.0
3.5
0.0
-3.5
-7.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0

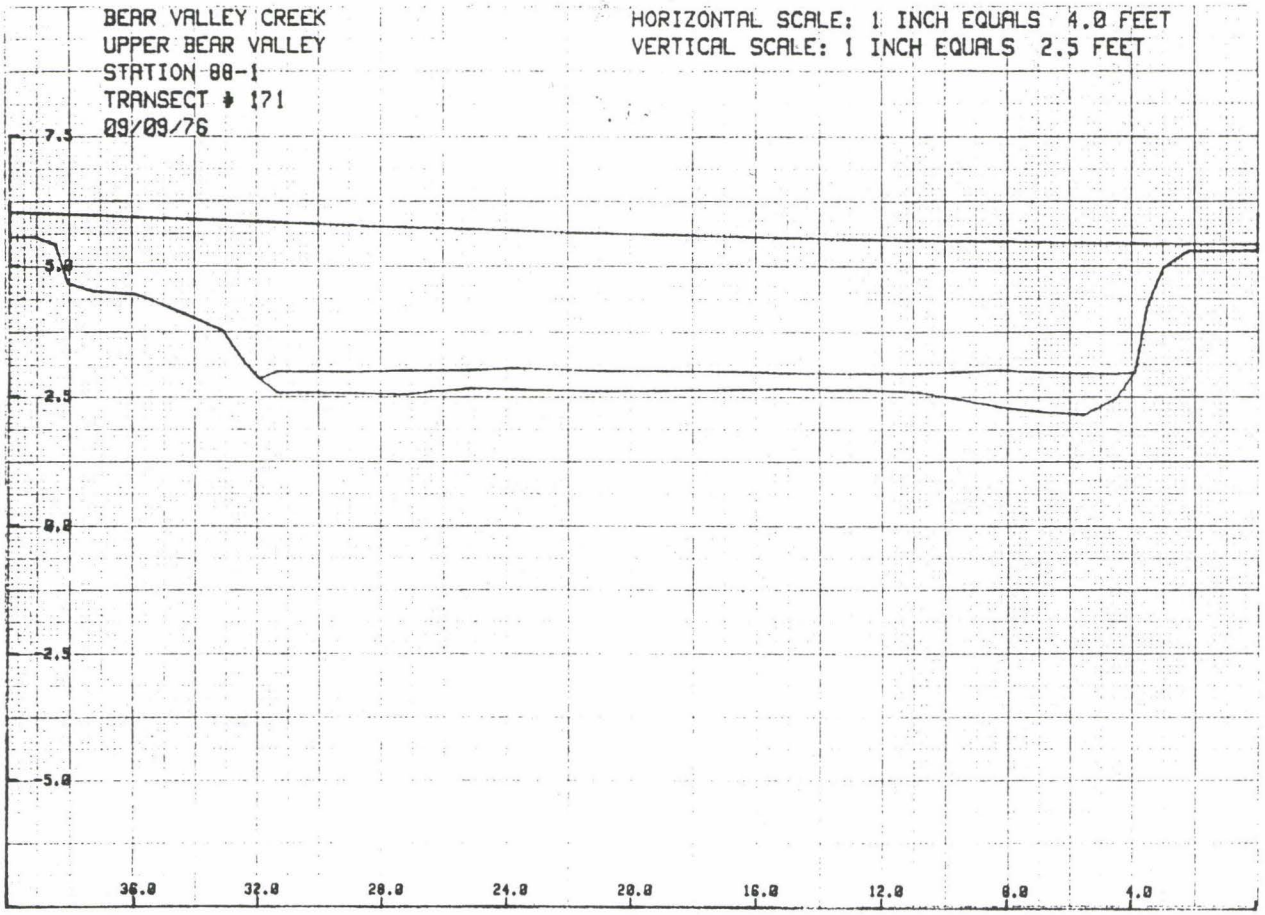

BEAR VALLEY CREEK
UPPER BEAR VALLEY
STATION 88-1
TRANSECT # 63
08/09/76
HORIZONTAL SCALE: 1 INCH EQUALS 3.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
31.5
28.0
24.5
21.0
17.5
14.0
10.5
7.0
3.5

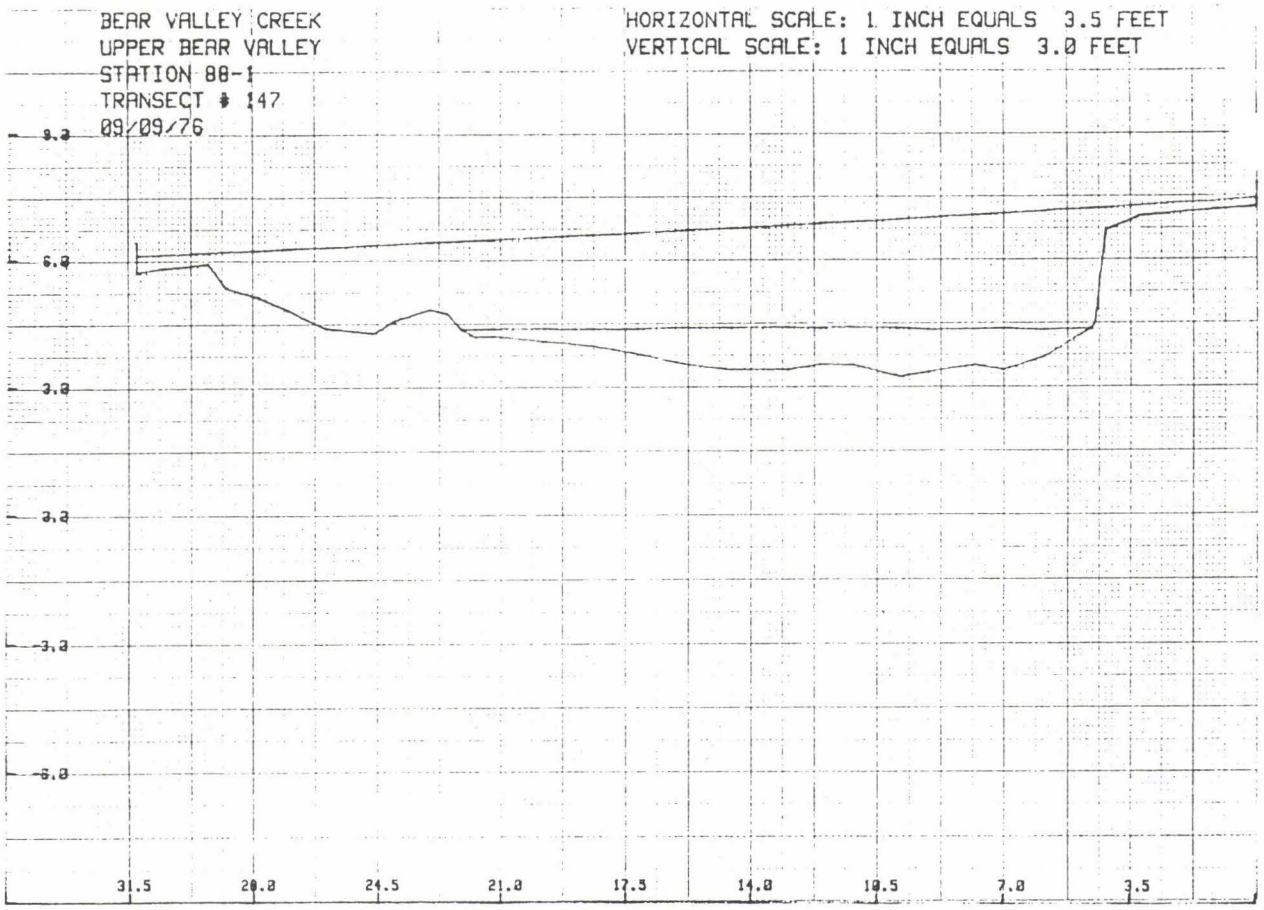

BEAR VALLEY CREEK
UPPER BEAR VALLEY
STATION 88-1
TRANSECT # 75
09/08/76
HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
36.0
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0

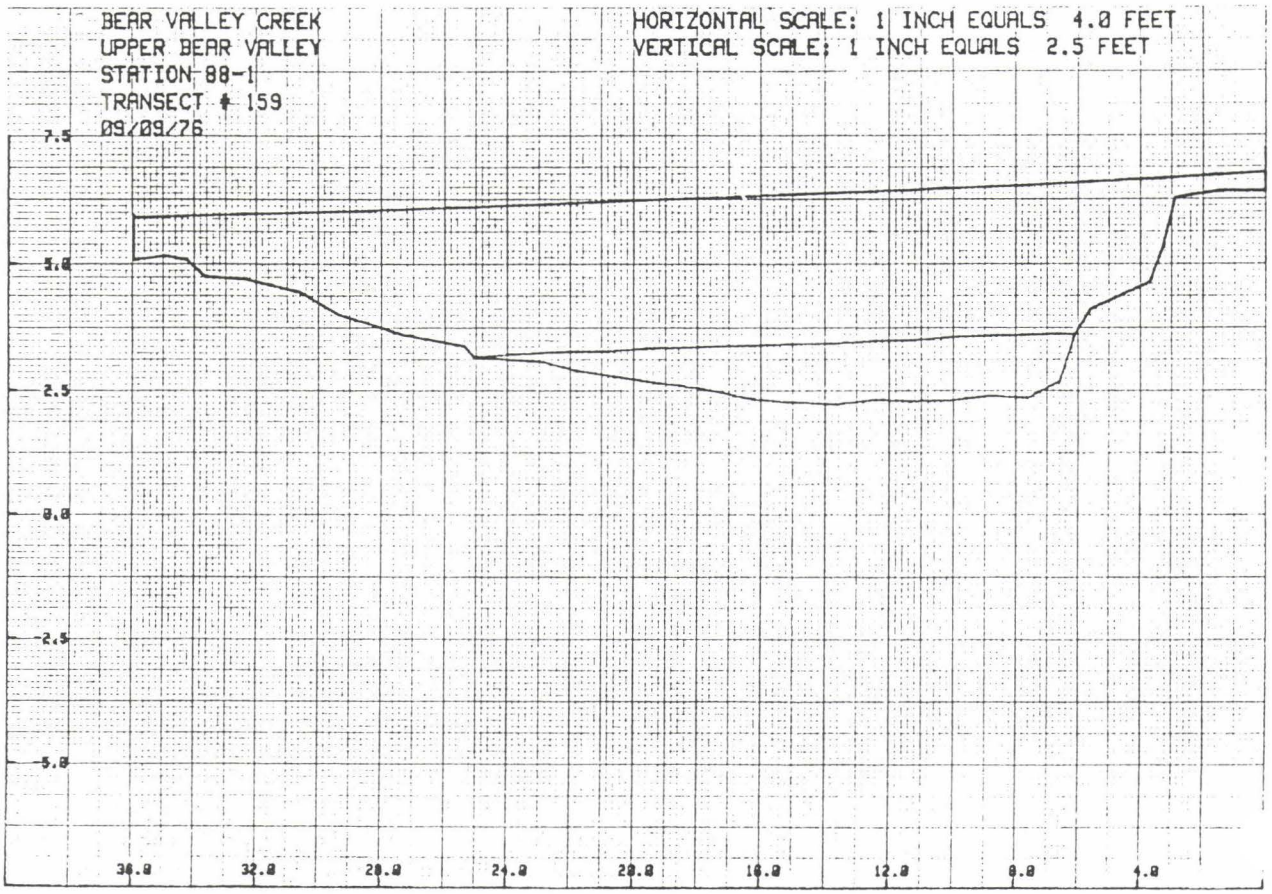

BEAR VALLEY CREEK
UPPER BEAR VALLEY
STATION 88-1
TRANSECT # 87
09/08/76
HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
36.0
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0

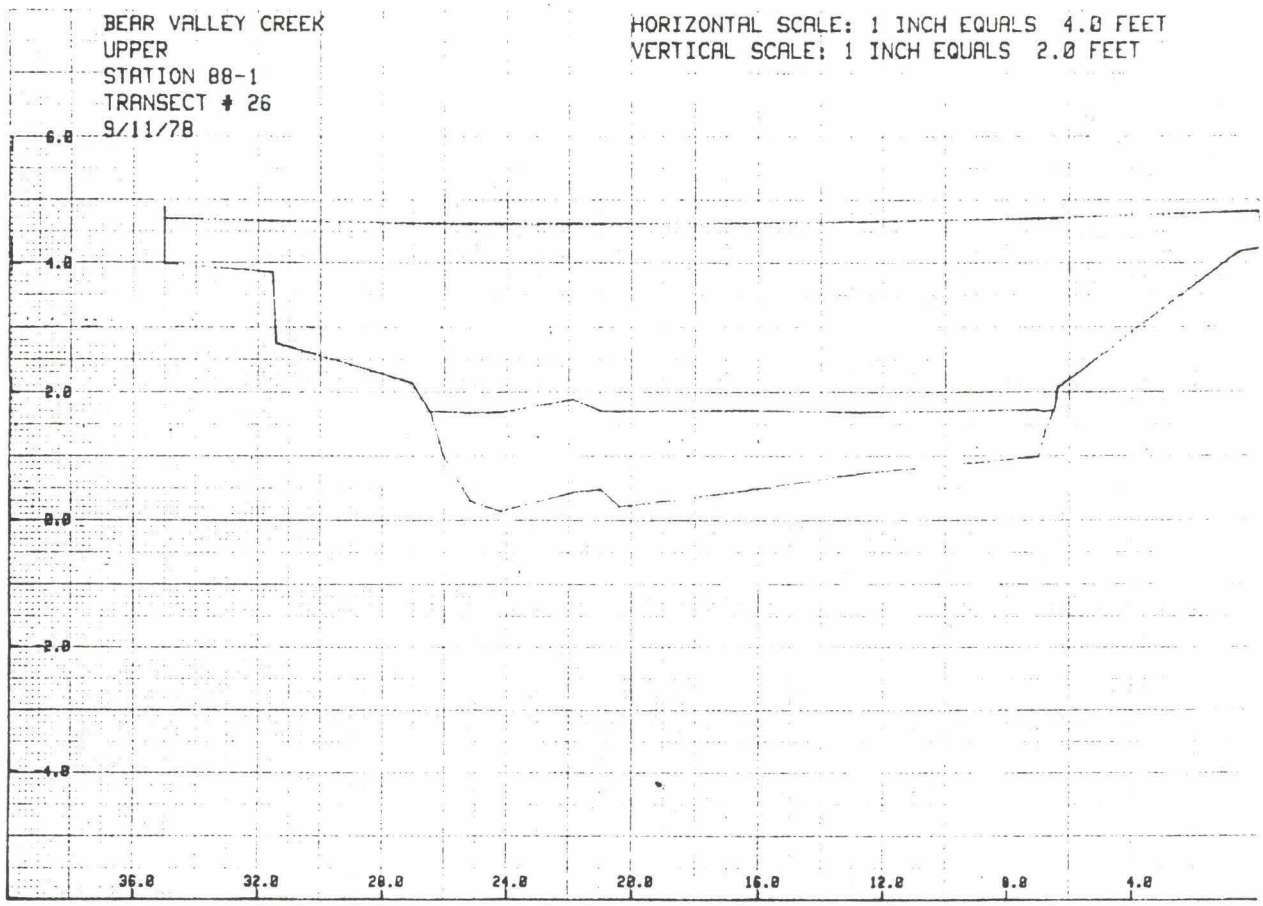

BEAR VALLEY CREEK
UPPER BEAR VALLEY
STATION 88-1
TRANSECT # 99
09/08/76
HORIZONTAL SCALE: 1 INCH EQUALS 3.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
31.5
28.0
24.5
21.0
17.5
14.0
10.5
7.0
3.5

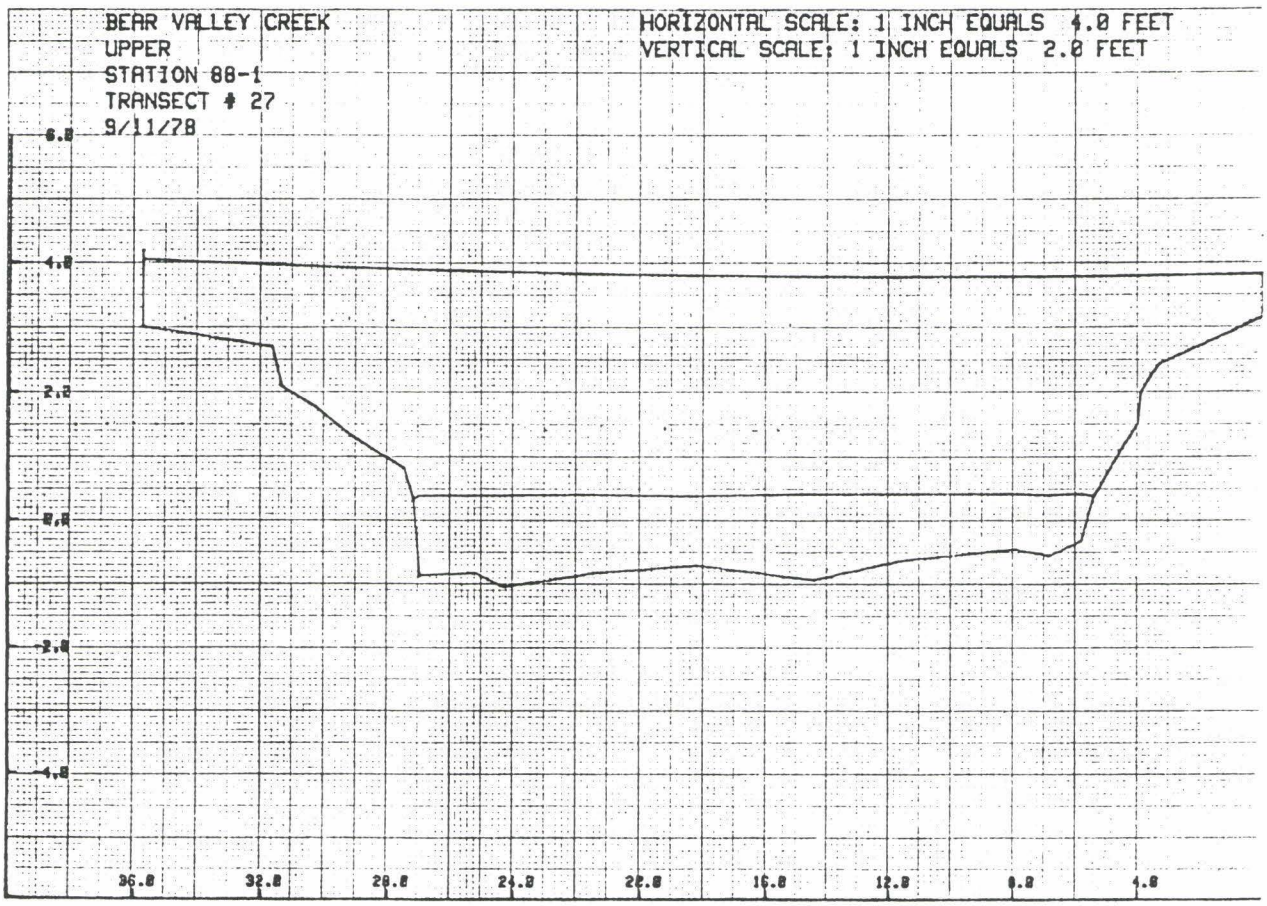

BEAR VALLEY CREEK
UPPER BEAR VALLEY
STATION 88-1
TRANSECT # 111
09/08/76
HORIZONTAL SCALE: 1 INCH EQUALS 6.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
54.0
48.0
42.0
36.0
30.0
24.0
18.0
12.0
6.0

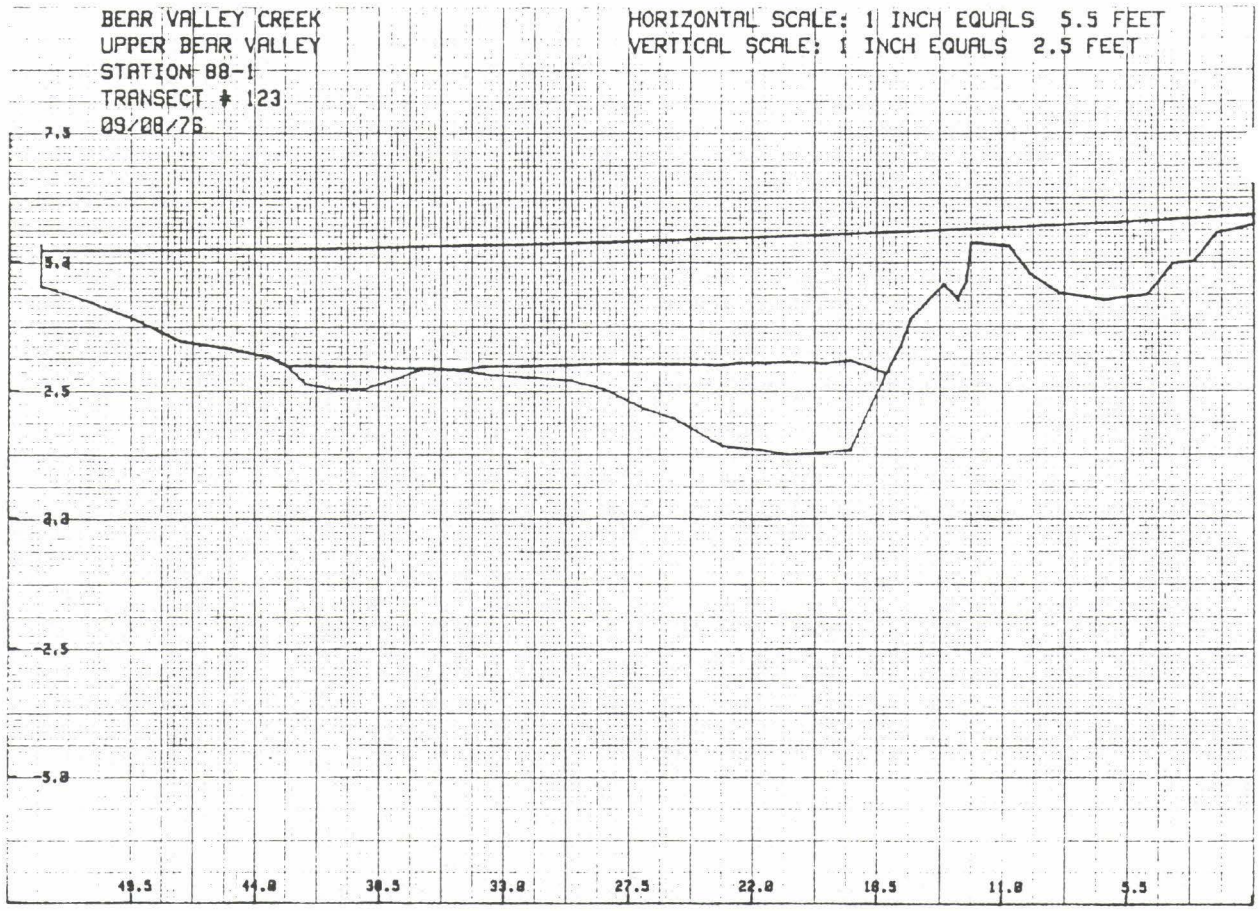

BEAR VALLEY CREEK
UPPER BEAR VALLEY
STATION 88-1
TRANSECT # 171
09/09/76
HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
36.0
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0

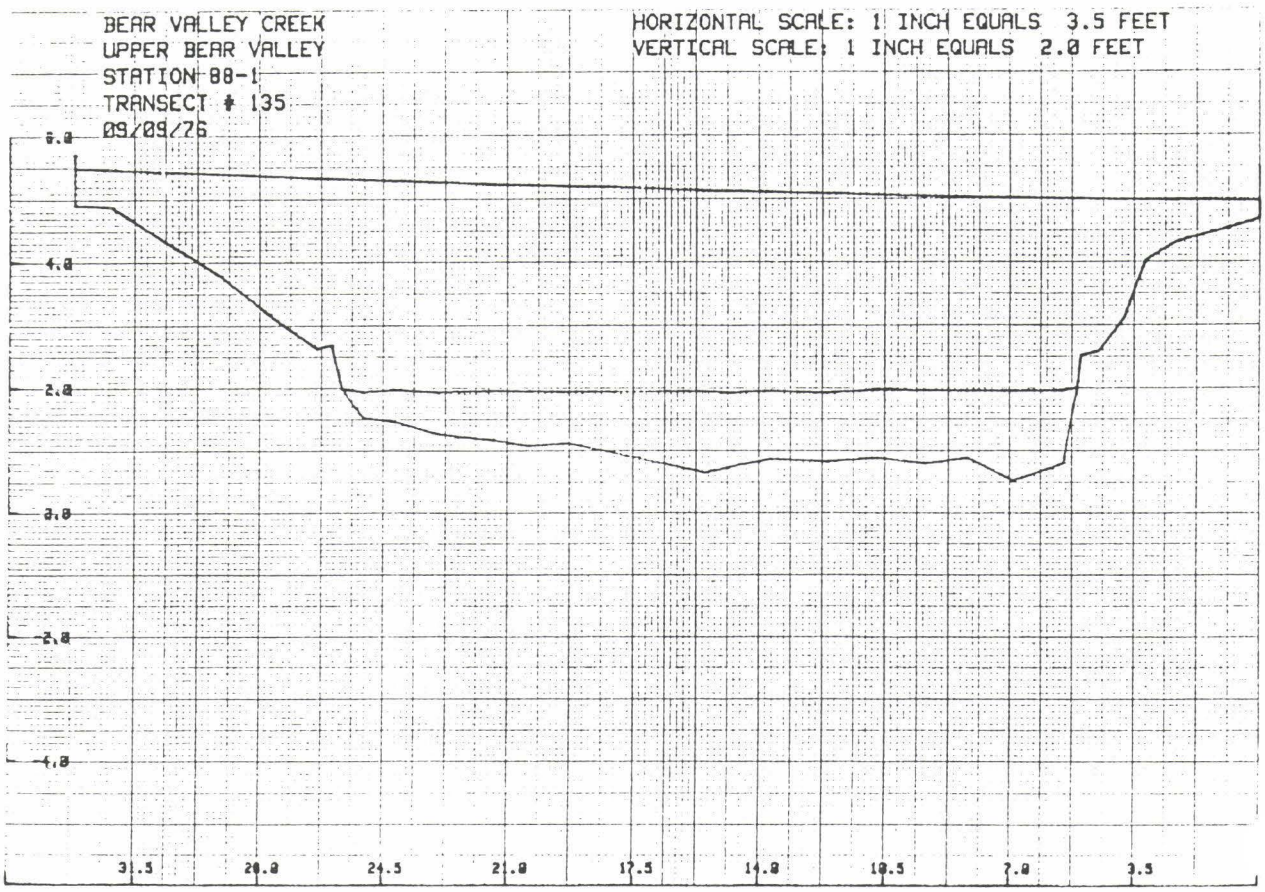

BEAR VALLEY CREEK
UPPER BEAR VALLEY
STATION 88-1
TRANSECT # 147
09/09/76
HORIZONTAL SCALE: 1 INCH EQUALS 3.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 3.0 FEET
9.0
6.0
3.0
0.0
-3.0
-6.0
31.5
28.0
24.5
21.0
17.5
14.0
10.5
7.0
3.5

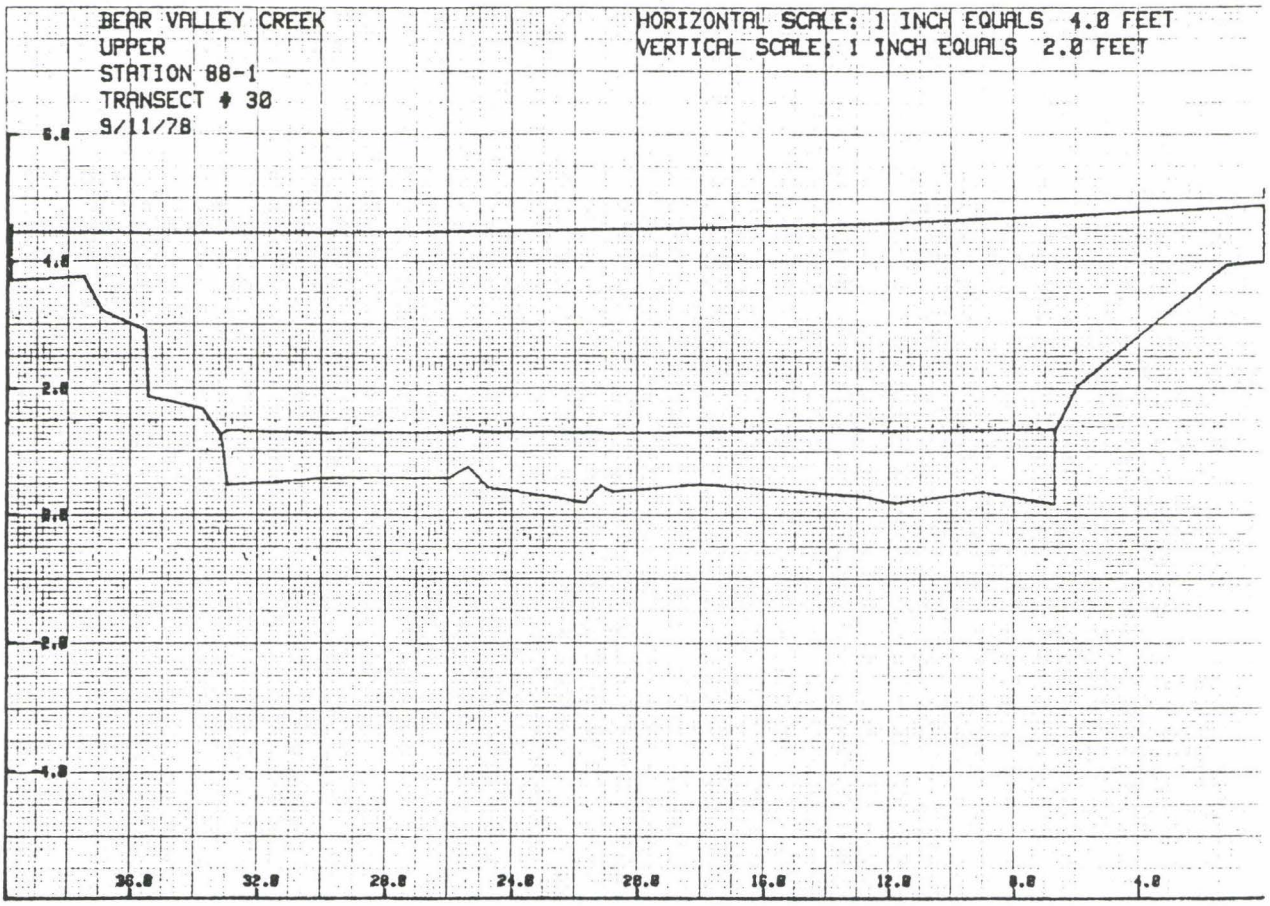

BEAR VALLEY CREEK
UPPER BEAR VALLEY
STATION 88-1
TRANSECT # 159
09/09/76
HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
36.0
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0

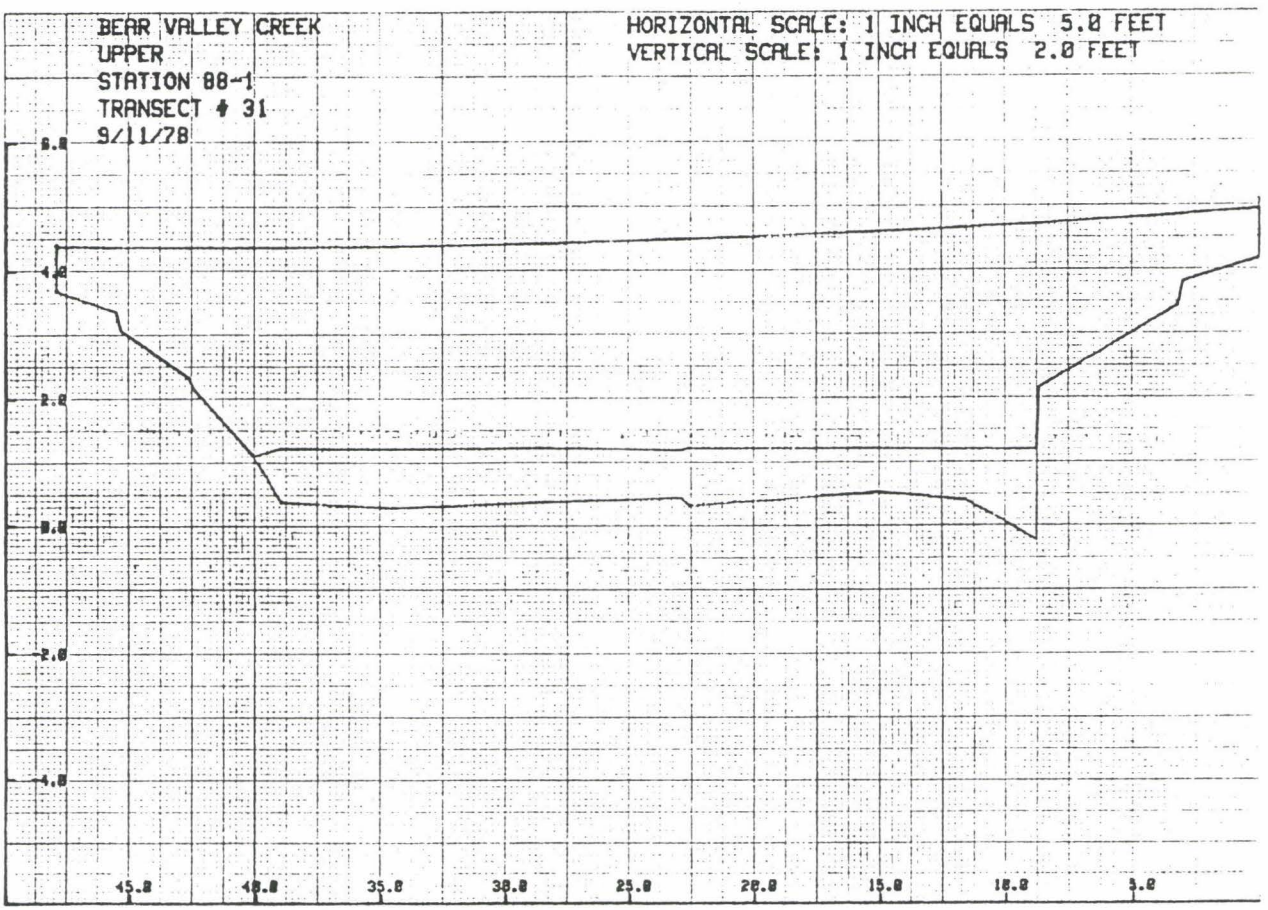

BEAR VALLEY CREEK
UPPER
STATION 88-1
TRANSECT # 26
9/11/78
HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
36.0
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0

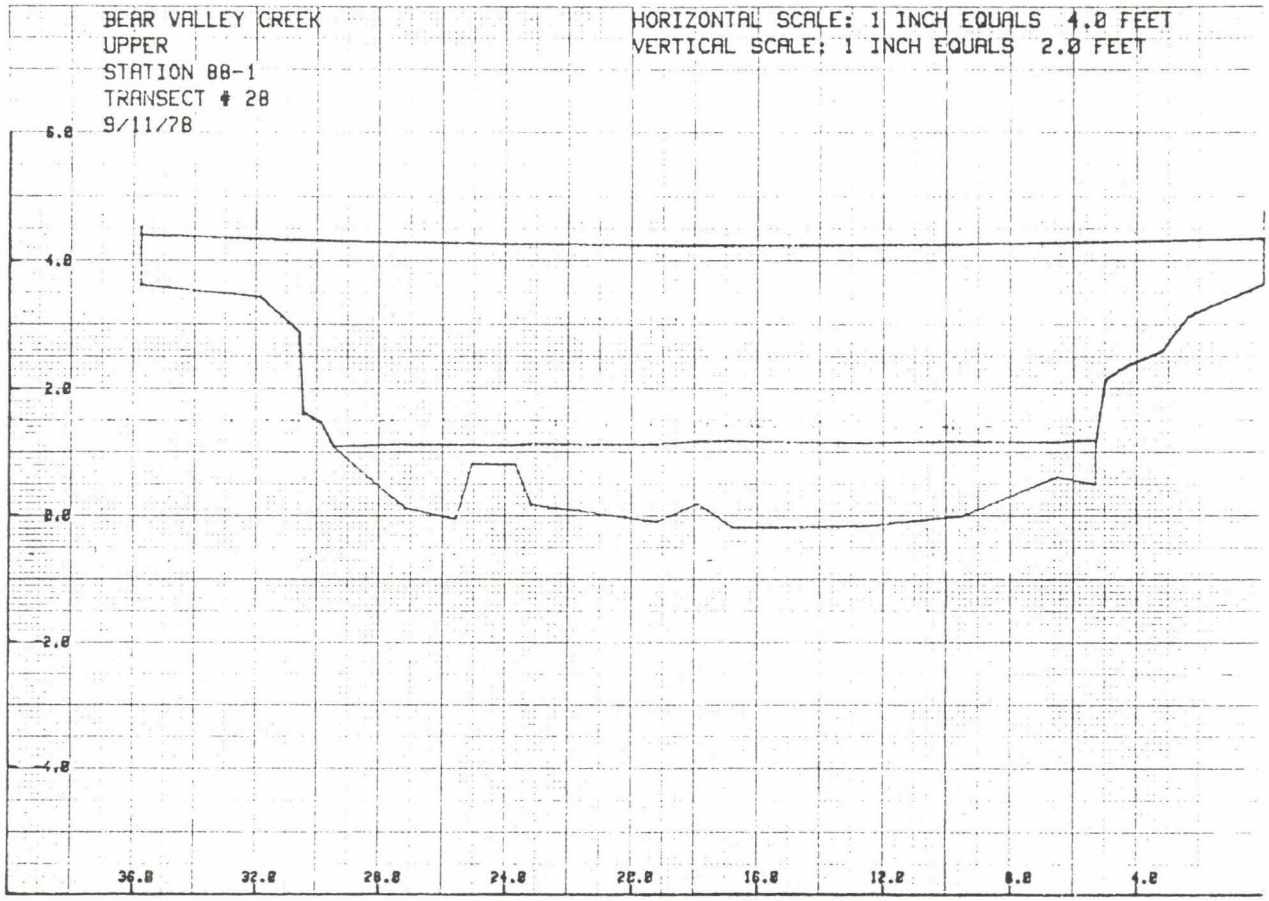

BEAR VALLEY CREEK
UPPER
STATION 88-1
TRANSECT # 27
9/11/78
HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
36.0
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0

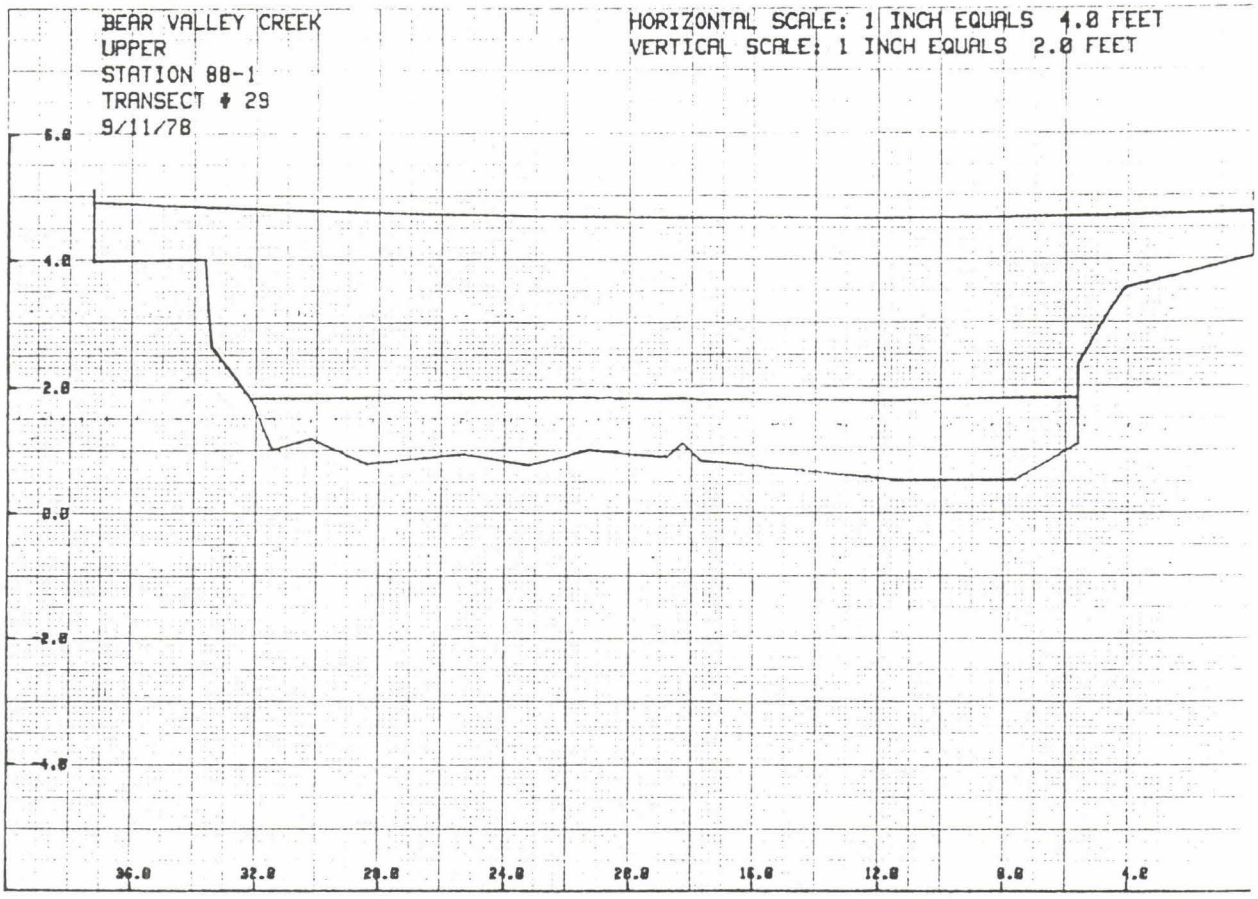

BEAR VALLEY CREEK
UPPER BEAR VALLEY
STATION 88-1
TRANSECT # 123
09/08/76
HORIZONTAL SCALE: 1 INCH EQUALS 5.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
49.5
44.0
38.5
33.0
27.5
22.0
16.5
11.0
5.5

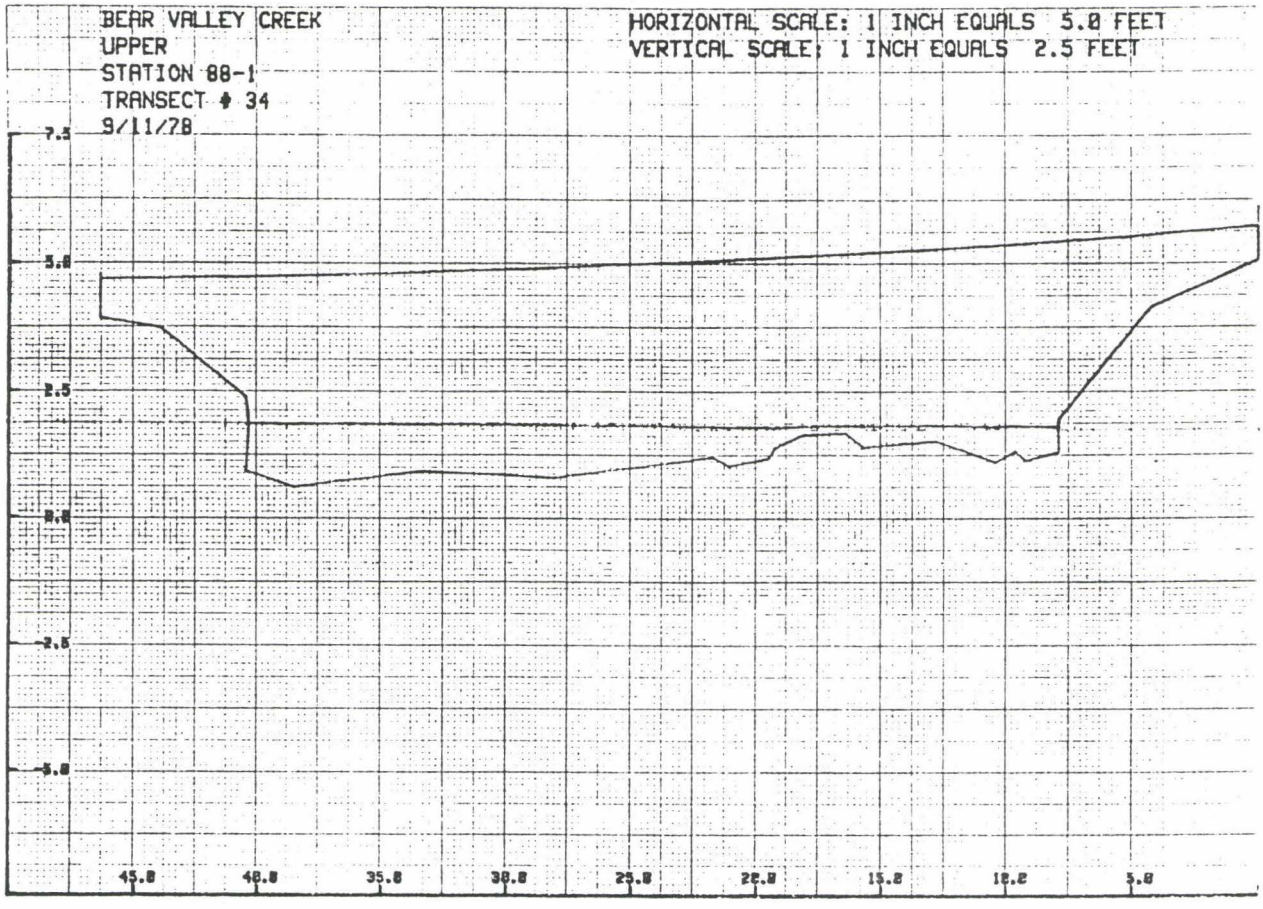

BEAR VALLEY CREEK
UPPER BEAR VALLEY
STATION 88-1
TRANSECT # 135
09/09/76
HORIZONTAL SCALE: 1 INCH EQUALS 3.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
31.5
28.0
24.5
21.0
17.5
14.0
10.5
7.0
3.5

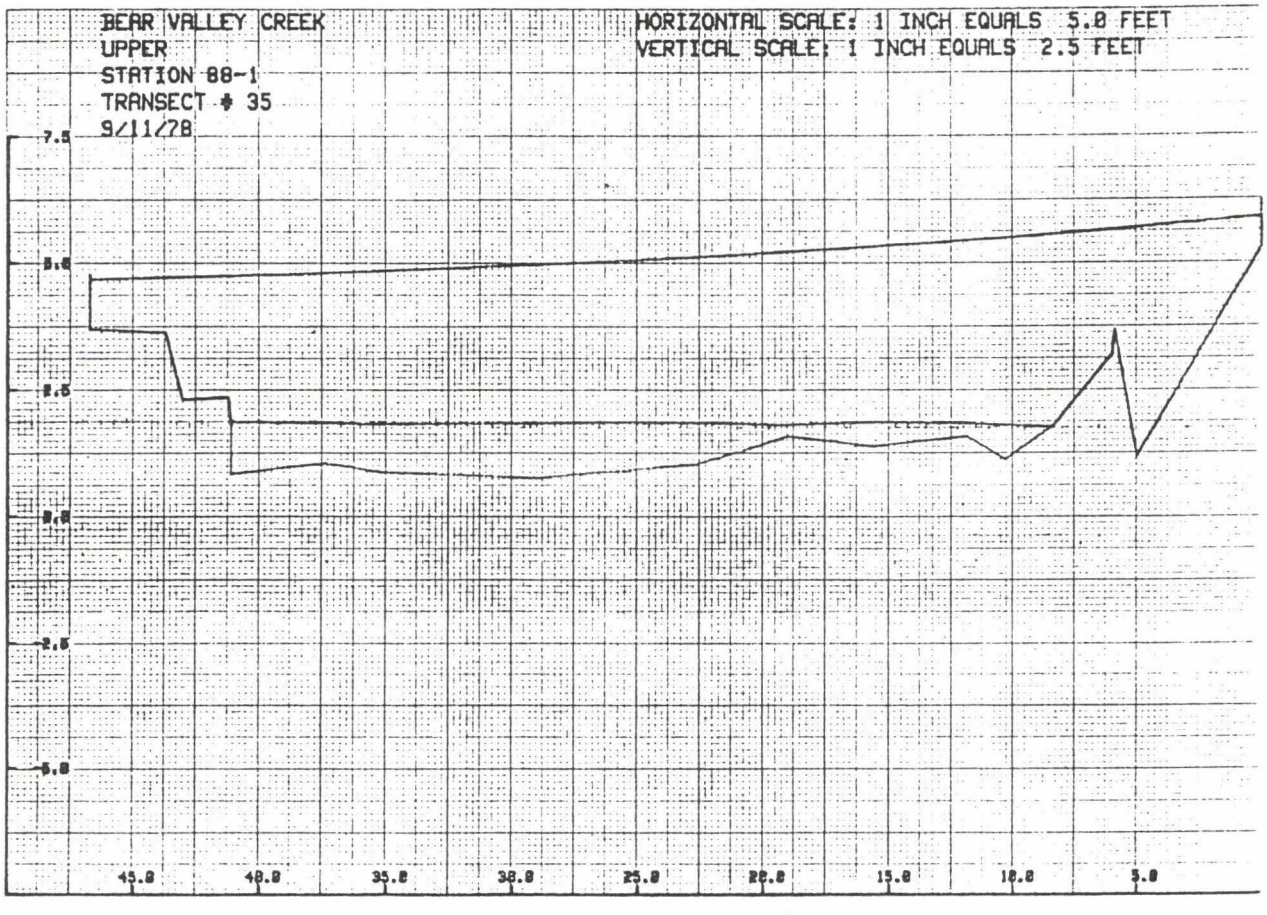

BEAR VALLEY CREEK
UPPER
STATION 88-1
TRANSECT # 30
9/11/78
HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
36.0
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0

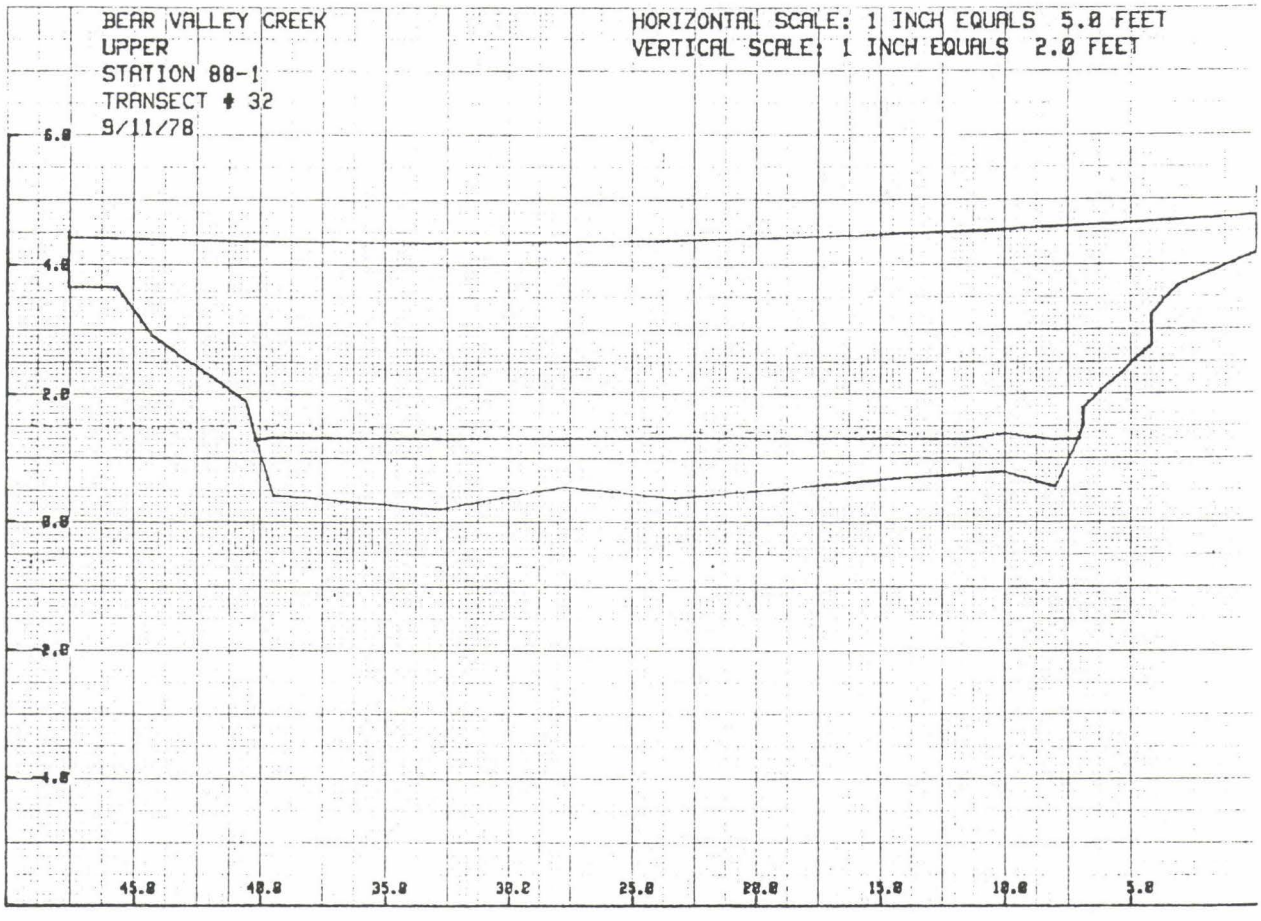

BEAR VALLEY CREEK
UPPER
STATION 88-1
TRANSECT # 31
9/11/78
HORIZONTAL SCALE: 1 INCH EQUALS 5.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0

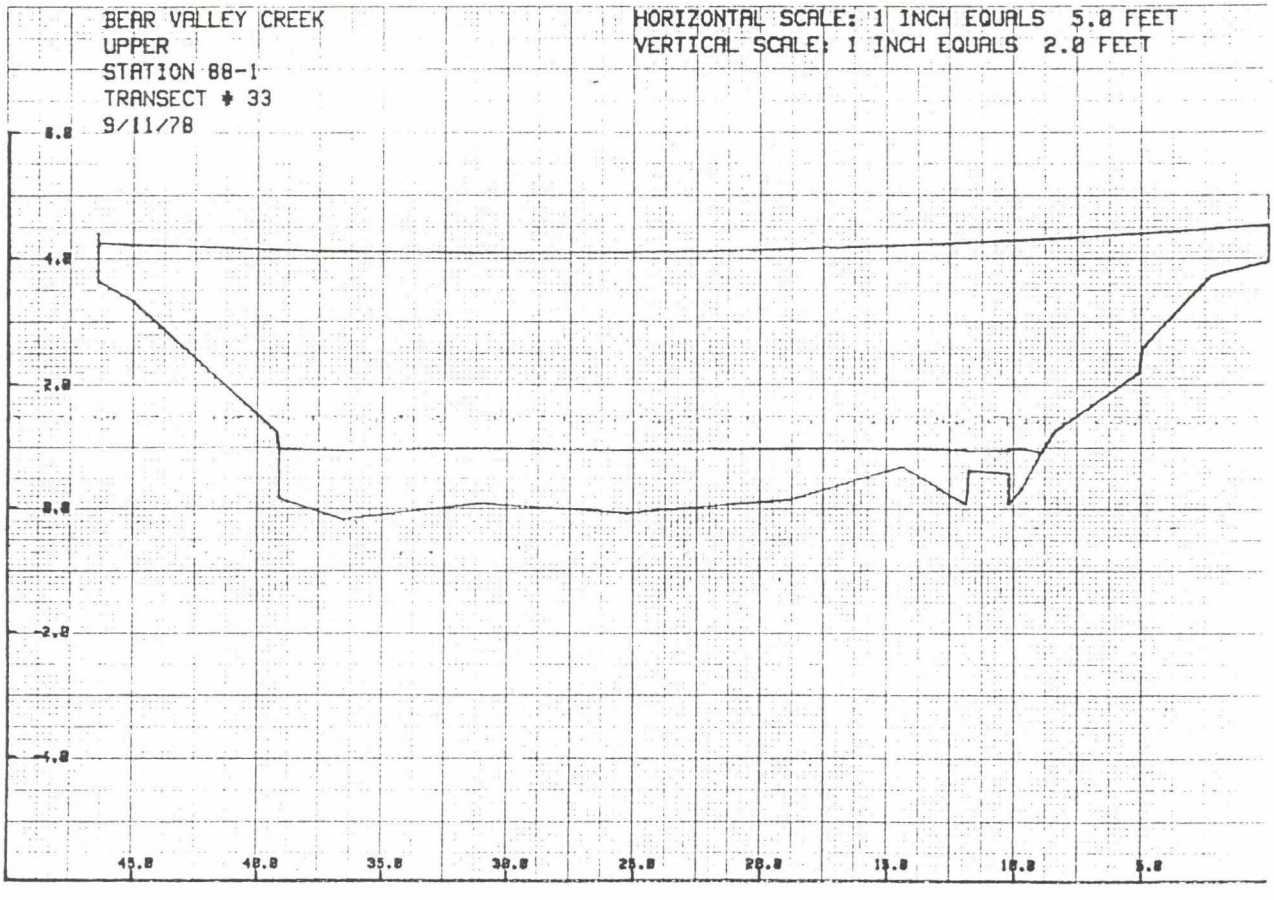

BEAR VALLEY CREEK
UPPER
STATION 88-1
TRANSECT # 28
9/11/78
HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
36.0
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0

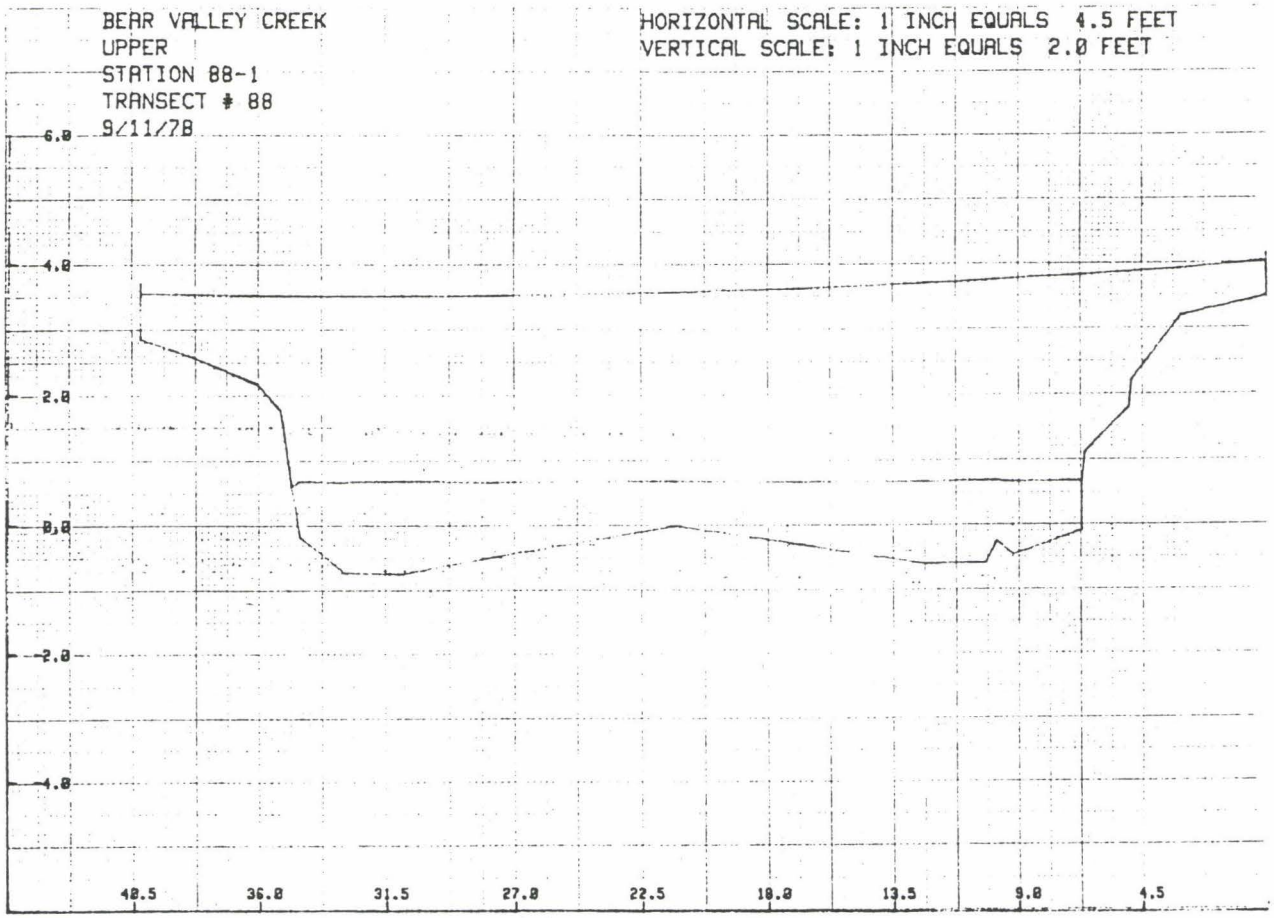

BEAR VALLEY CREEK
UPPER
STATION 88-1
TRANSECT # 29
9/11/78
HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
36.0
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0

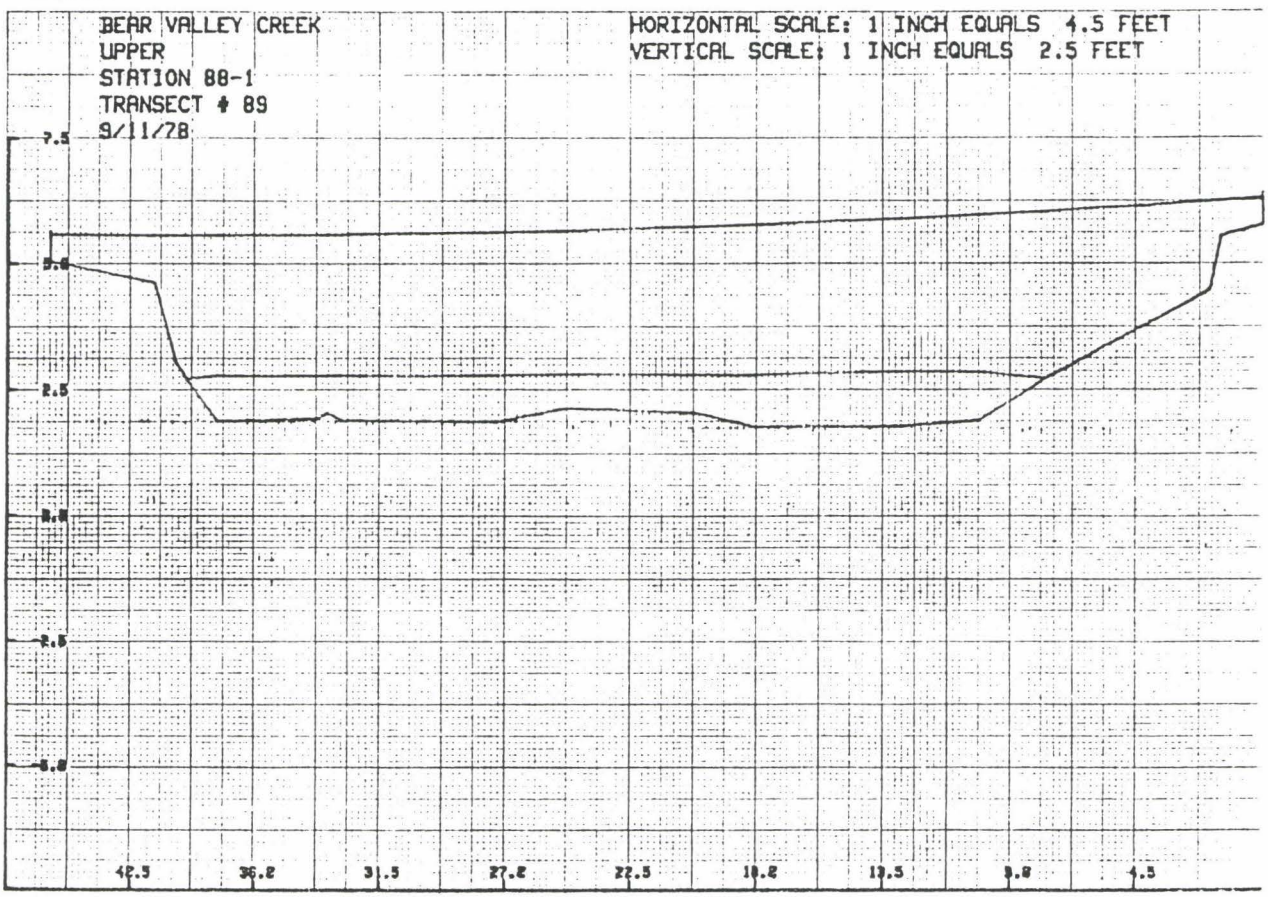

BEAR VALLEY CREEK
UPPER
STATION 88-1
TRANSECT # 34
9/11/78
HORIZONTAL SCALE: 1 INCH EQUALS 5.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0


BEAR VALLEY CREEK
UPPER
STATION 88-1
TRANSECT # 35
9/11/78
HORIZONTAL SCALE: 1 INCH EQUALS 5.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0


BEAR VALLEY CREEK
UPPER
STATION 88-1
TRANSECT # 32
9/11/78
HORIZONTAL SCALE: 1 INCH EQUALS 5.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0

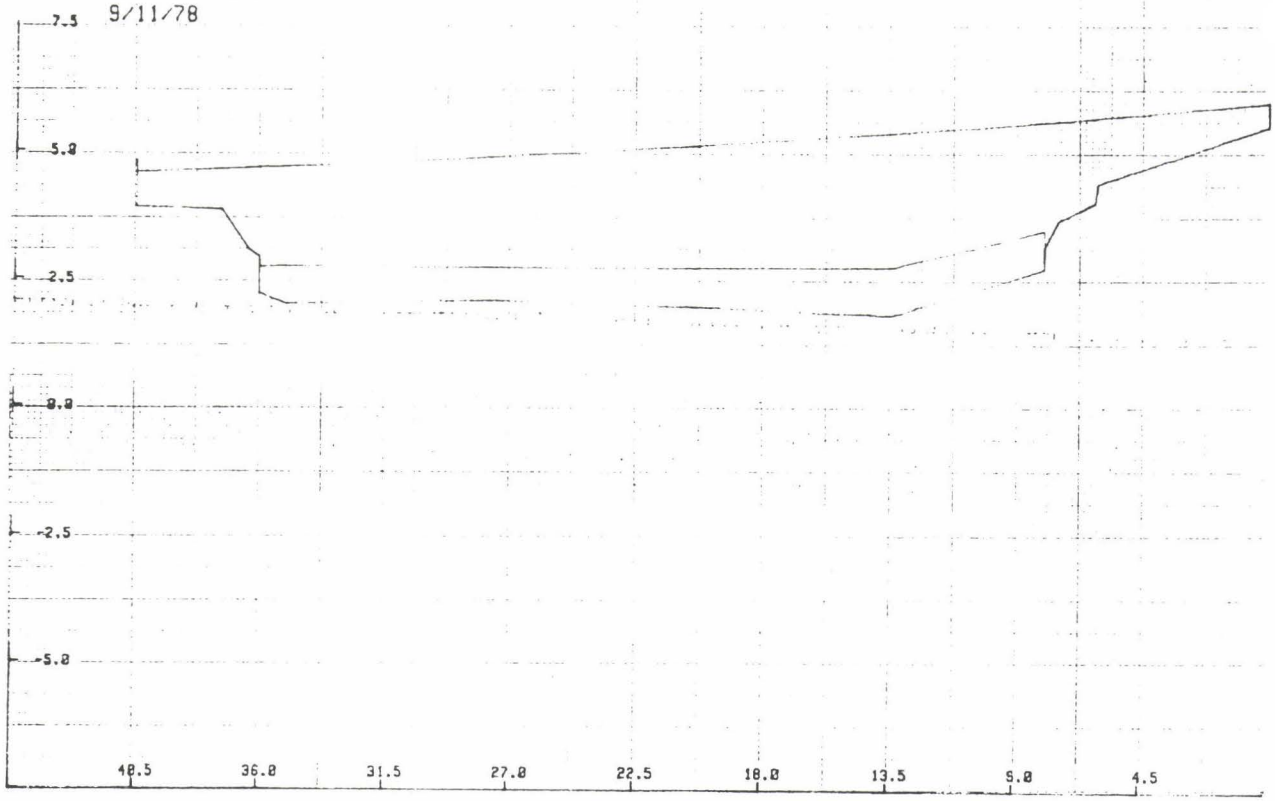

BEAR VALLEY CREEK
UPPER
STATION 88-1
TRANSECT # 33
9/11/78
HORIZONTAL SCALE: 1 INCH EQUALS 5.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0


BEAR VALLEY CREEK
UPPER
STATION 88-1
TRANSECT # 88
9/11/78
HORIZONTAL SCALE: 1 INCH EQUALS 4.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
40.5
36.0
31.5
27.0
22.5
18.0
13.5
9.0
4.5


BEAR VALLEY CREEK
UPPER
STATION 88-1
TRANSECT # 89
9/11/78
HORIZONTAL SCALE: 1 INCH EQUALS 4.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
2.5
40.5
36.0
31.5
27.0
22.5
18.0
13.5
9.0
4.5

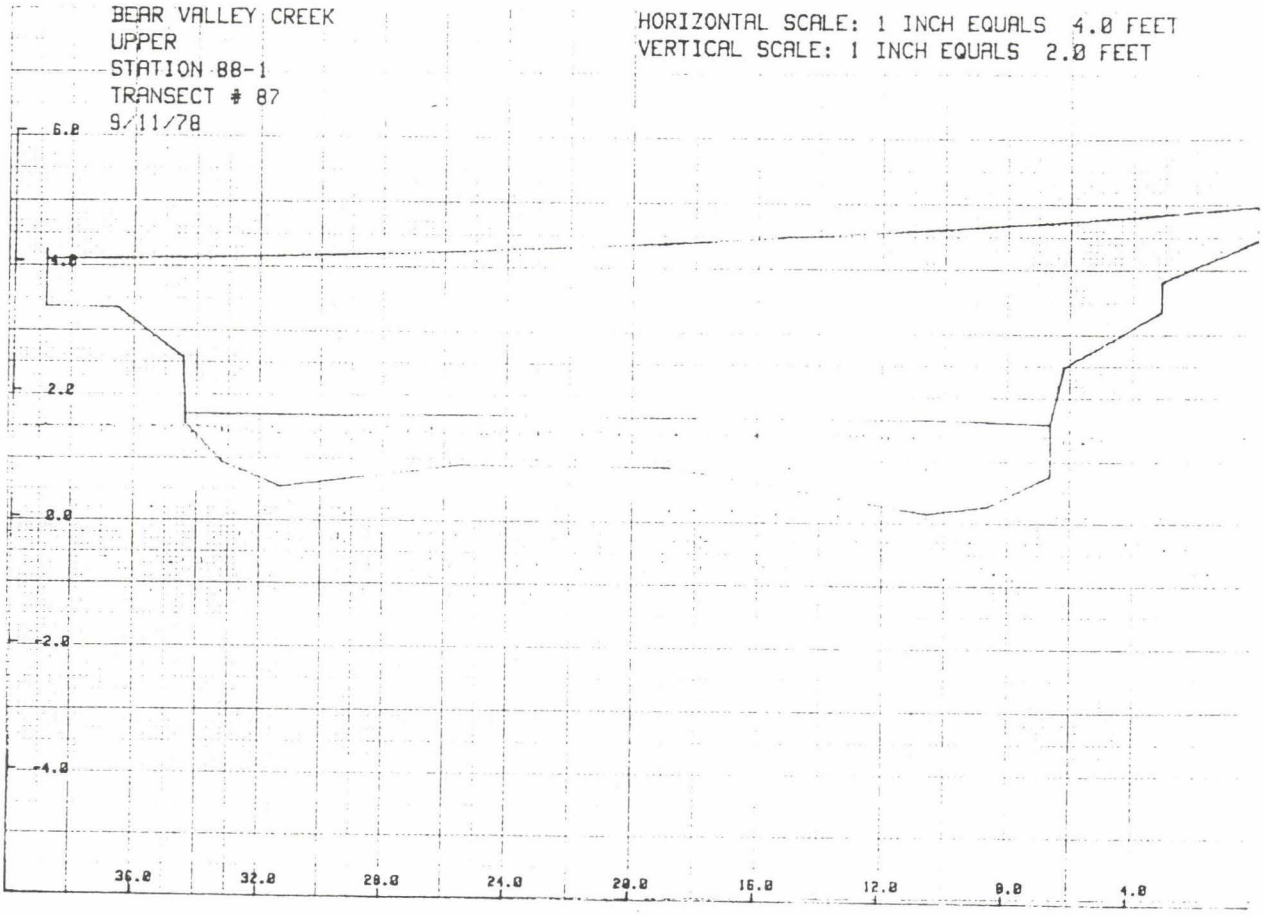
BEAR VALLEY CREEK
UPPER
STATION 88-1
TRANSECT # 86
9/11/78

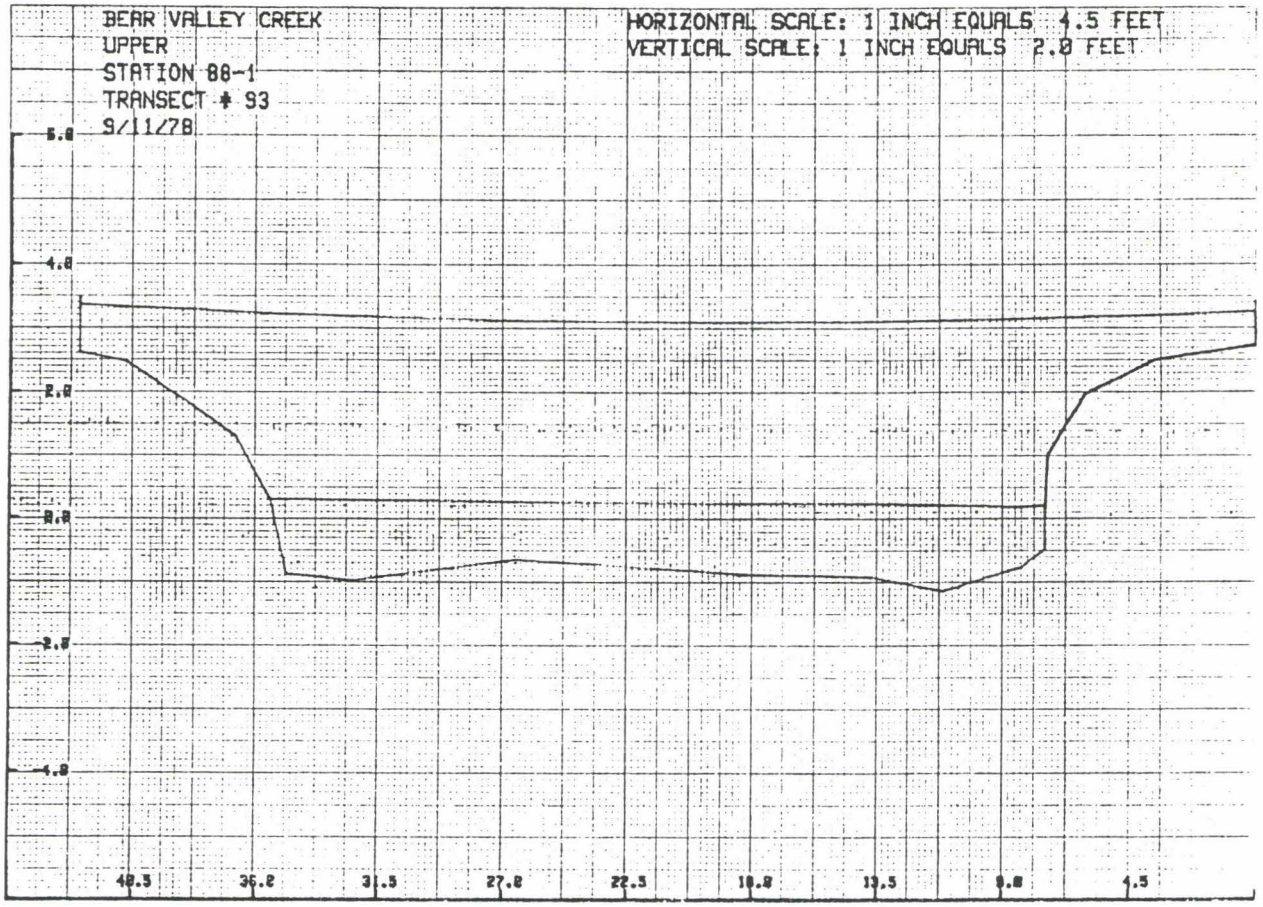
HORIZONTAL SCALE: 1 INCH EQUALS 4.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET

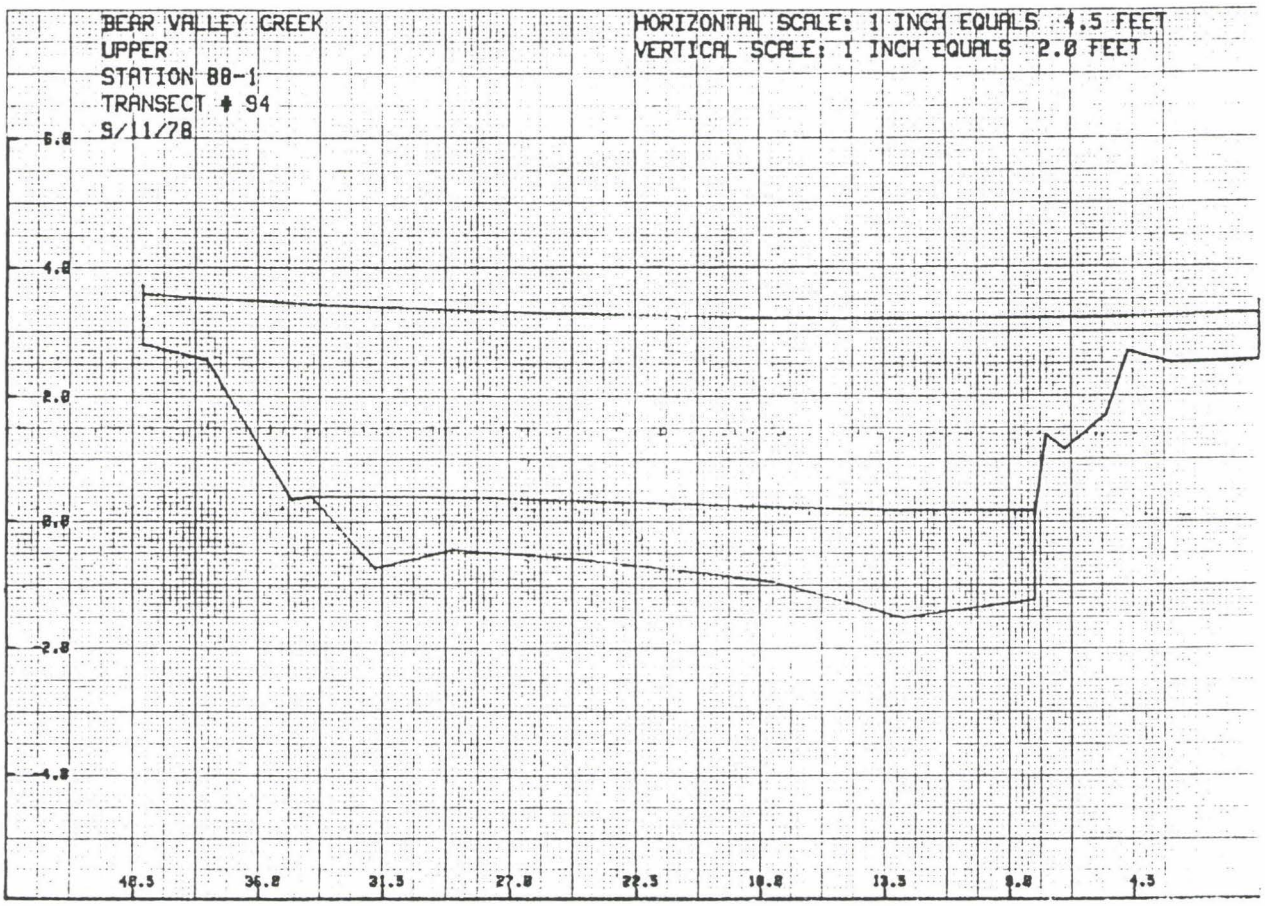


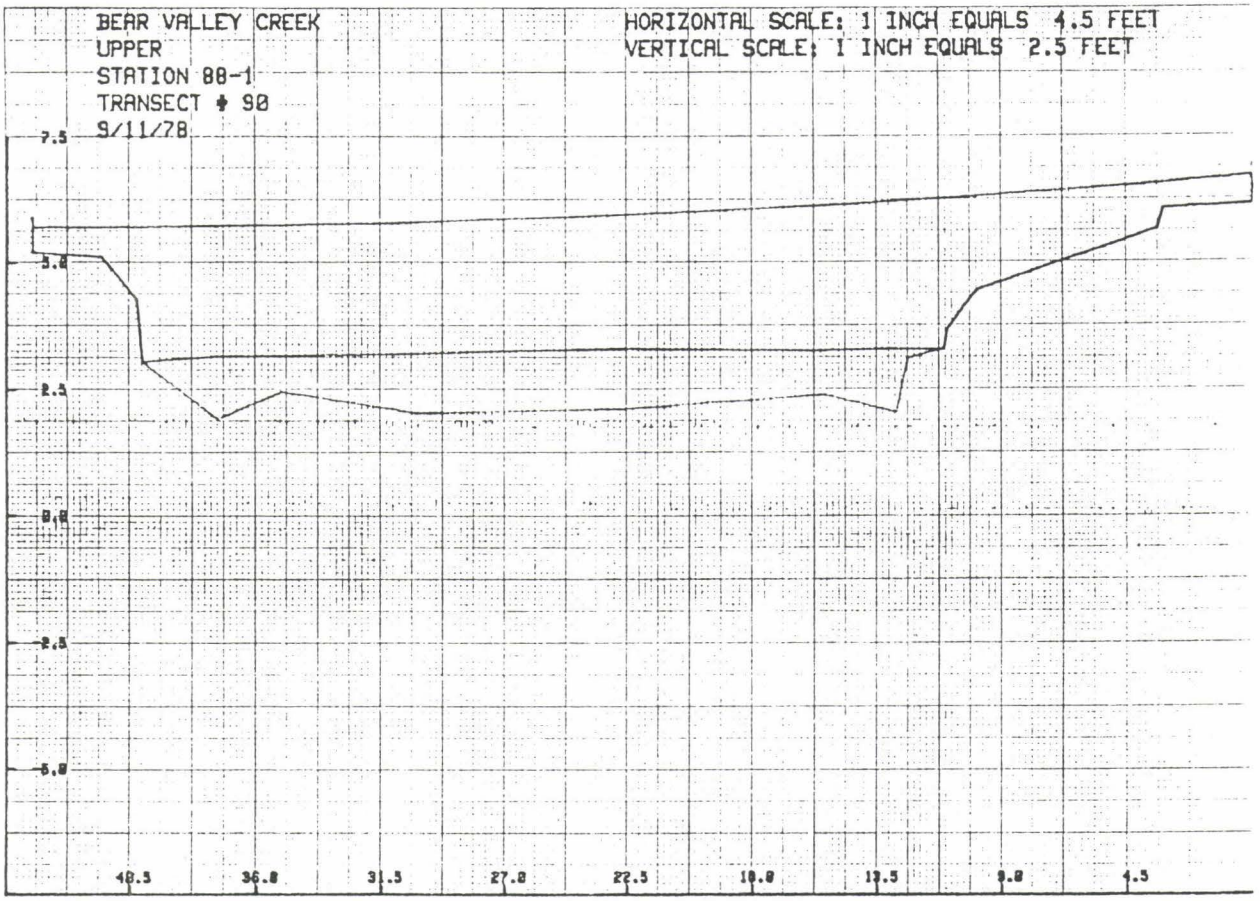
BEAR VALLEY CREEK
UPPER
STATION 88-1
TRANSECT # 87
9/11/78

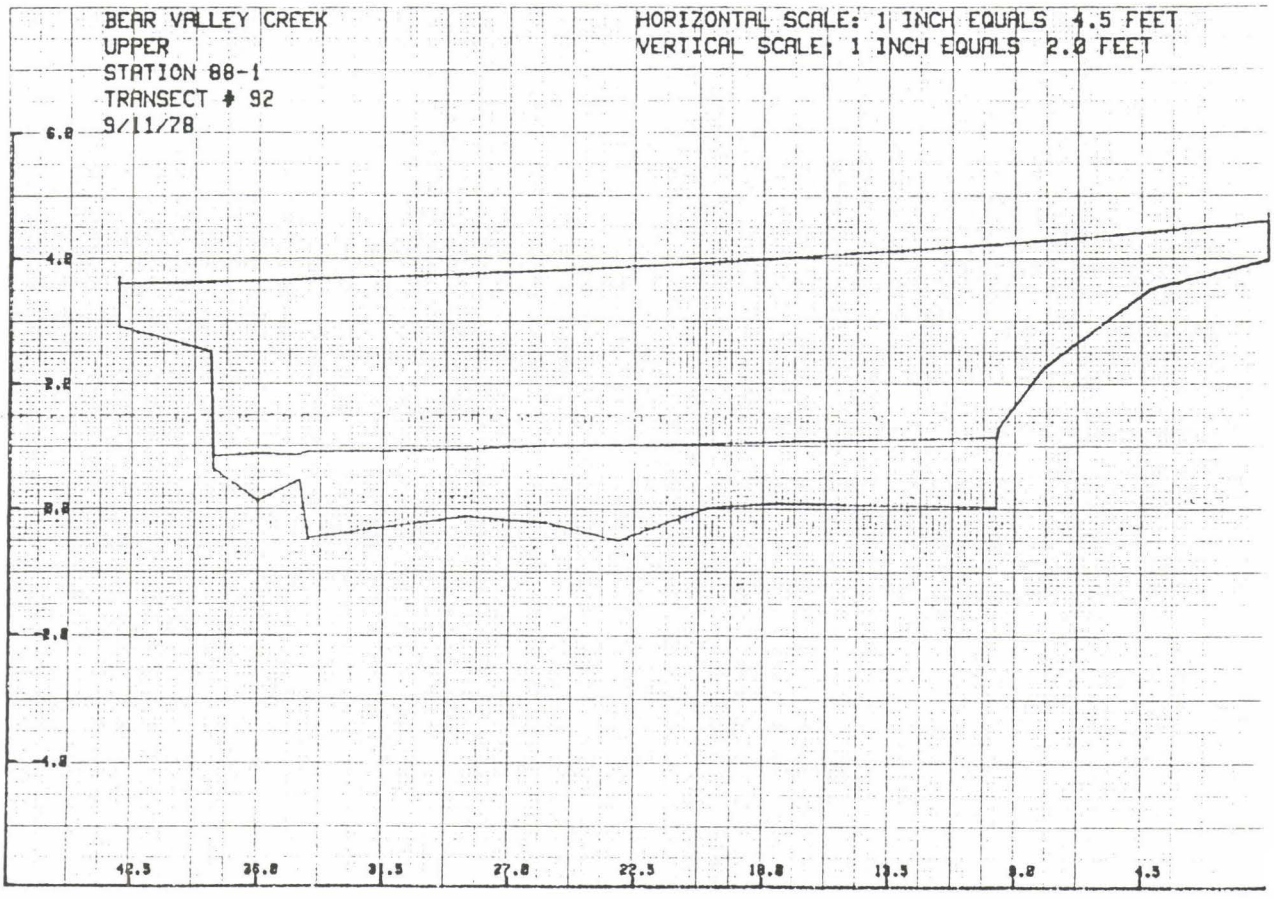
HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET

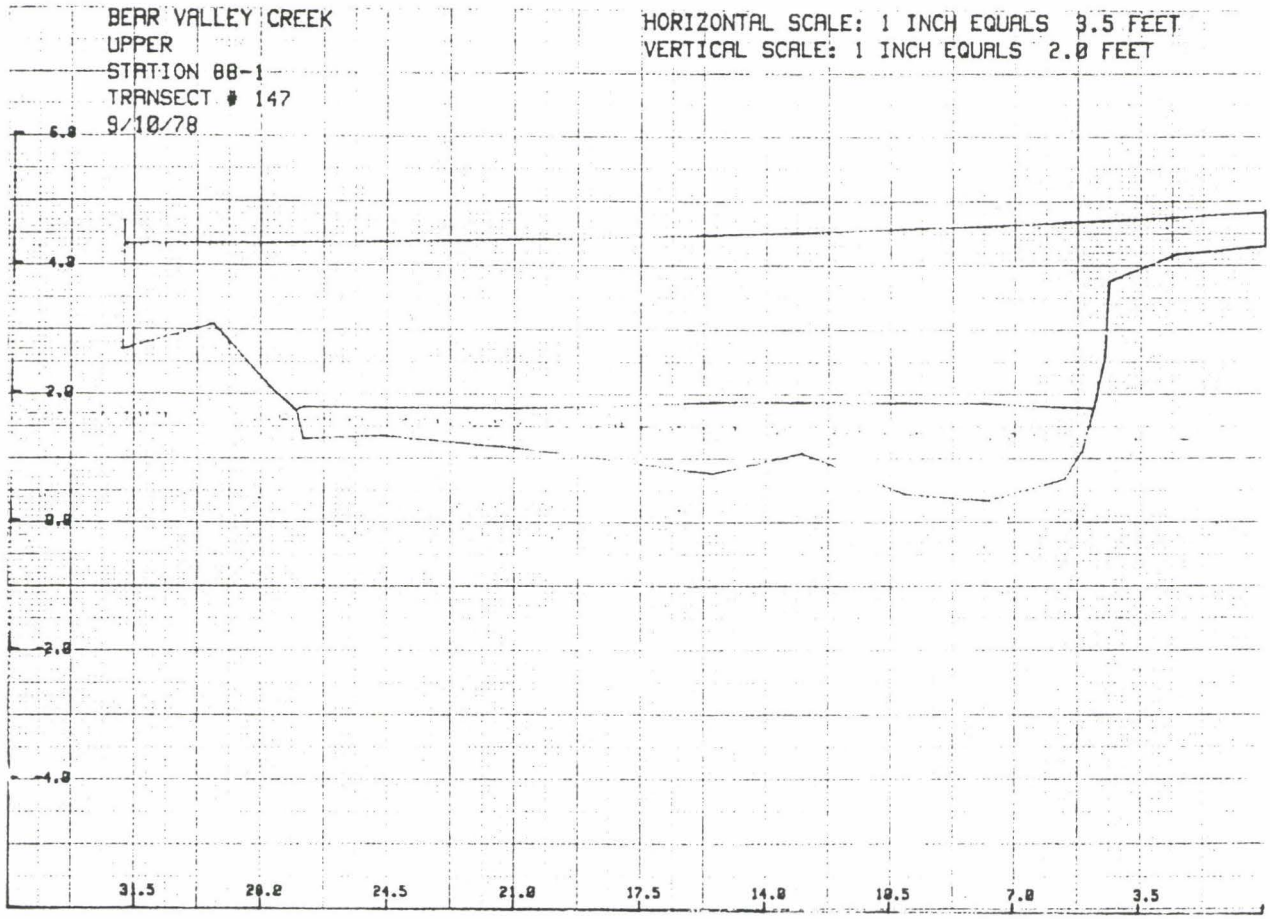


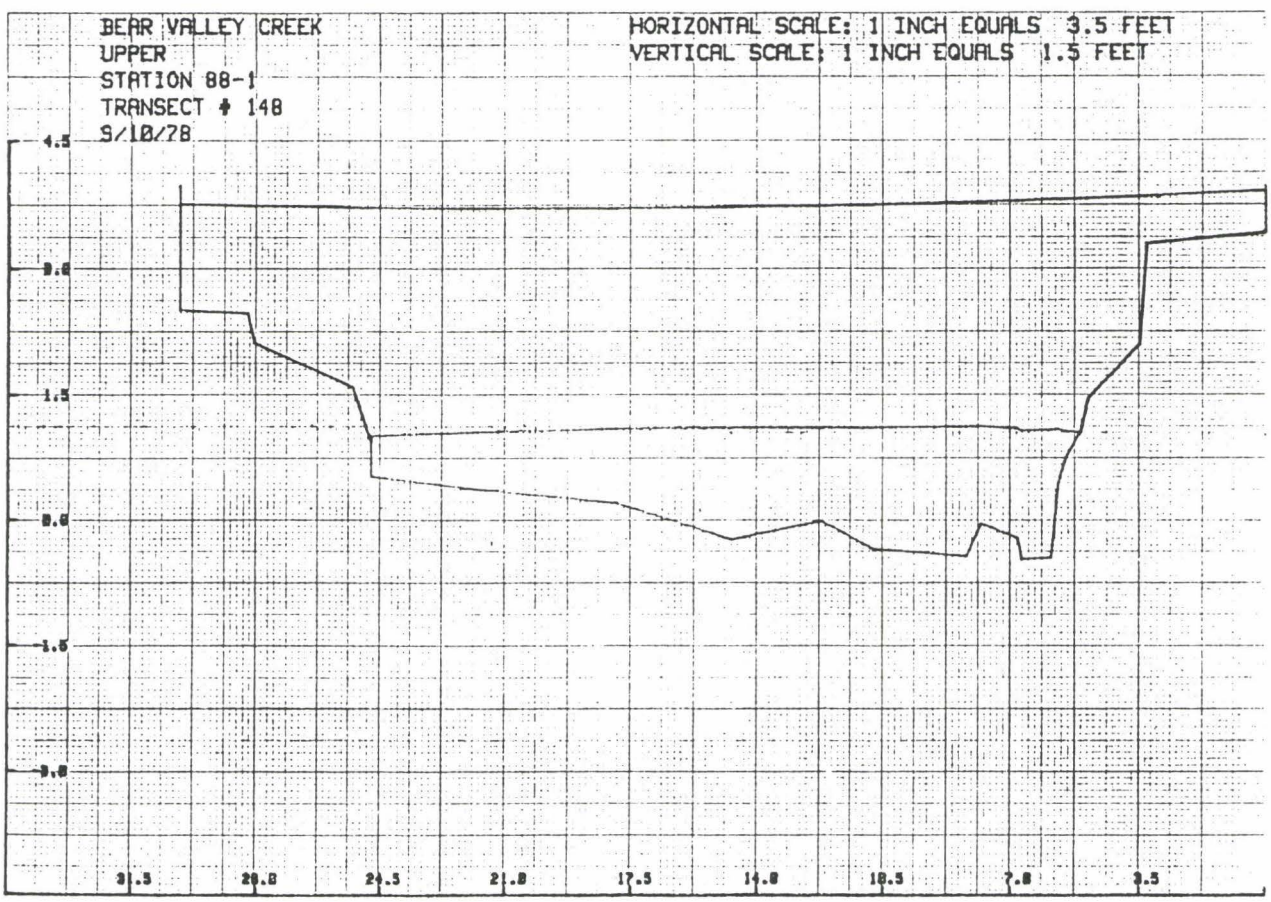

BEAR VALLEY CREEK
UPPER
STATION 88-1
TRANSECT # 93
9/11/78
HORIZONTAL SCALE: 1 INCH EQUALS 4.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
40.5
36.0
31.5
27.0
22.5
18.0
13.5
9.0
4.5

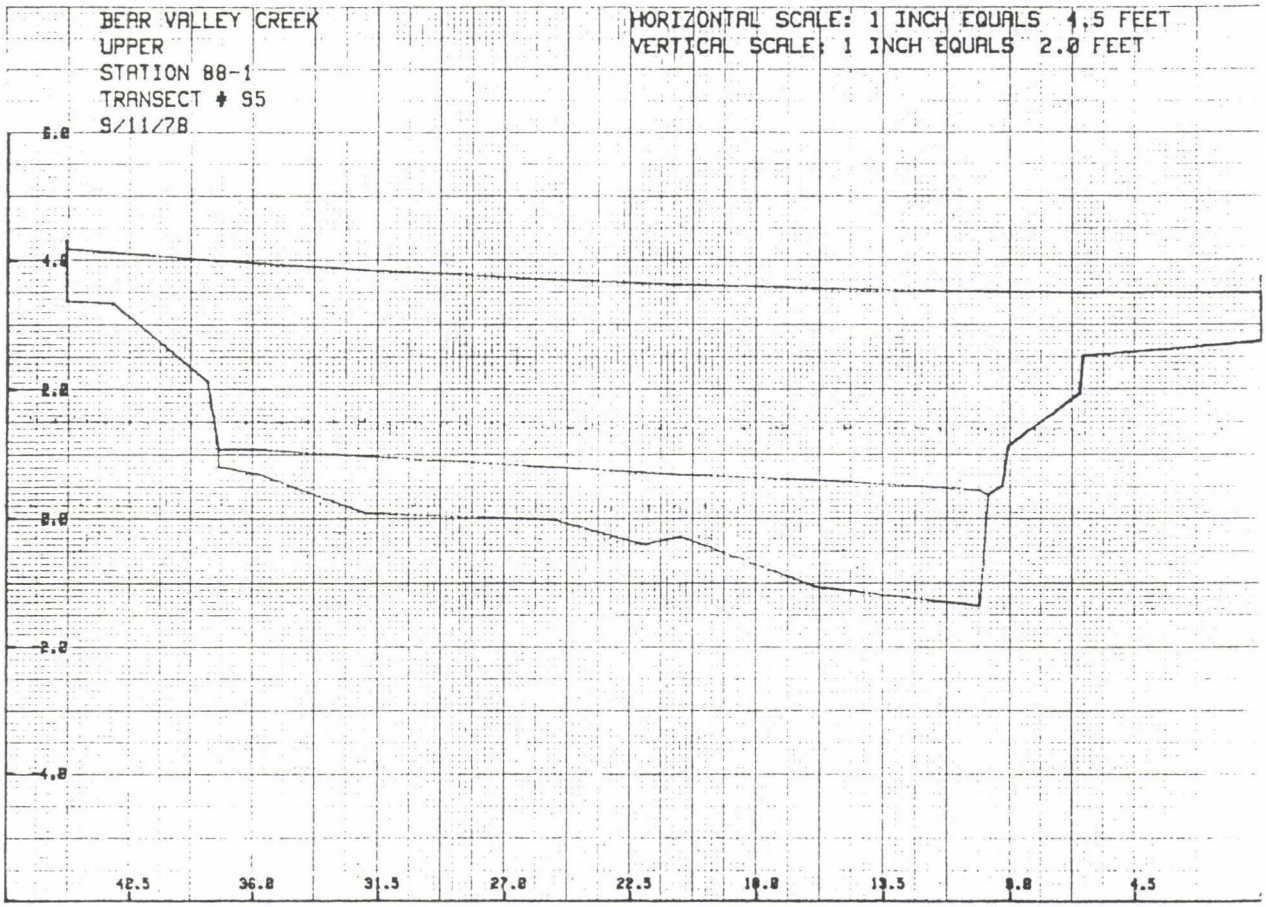

BEAR VALLEY CREEK
UPPER
STATION 88-1
TRANSECT # 94
9/11/78
HORIZONTAL SCALE: 1 INCH EQUALS 4.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
40.5
36.0
31.5
27.0
22.5
18.0
13.5
9.0
4.5

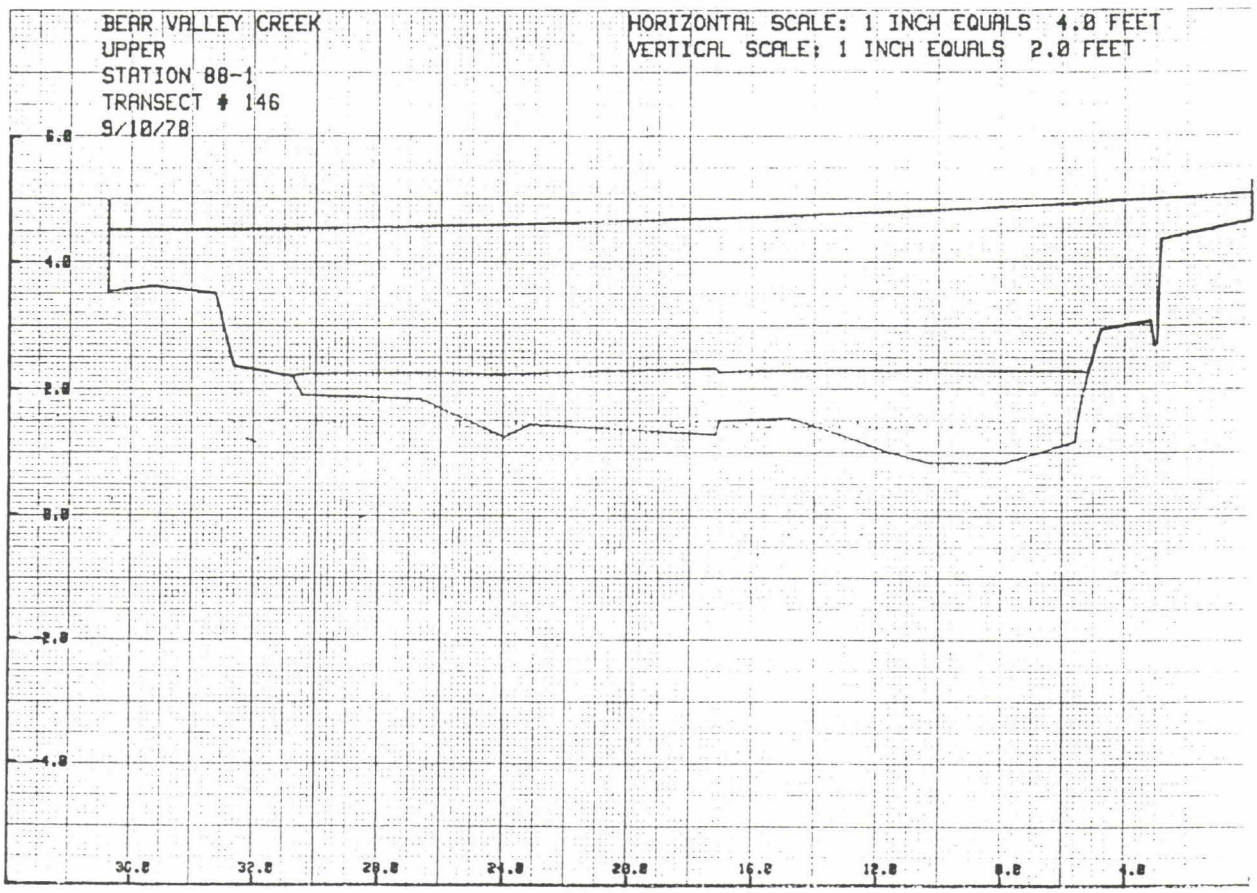

BEAR VALLEY CREEK
UPPER
STATION 88-1
TRANSECT # 90
9/11/78
HORIZONTAL SCALE: 1 INCH EQUALS 4.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
40.5
36.0
31.5
27.0
22.5
18.0
13.5
9.0
4.5

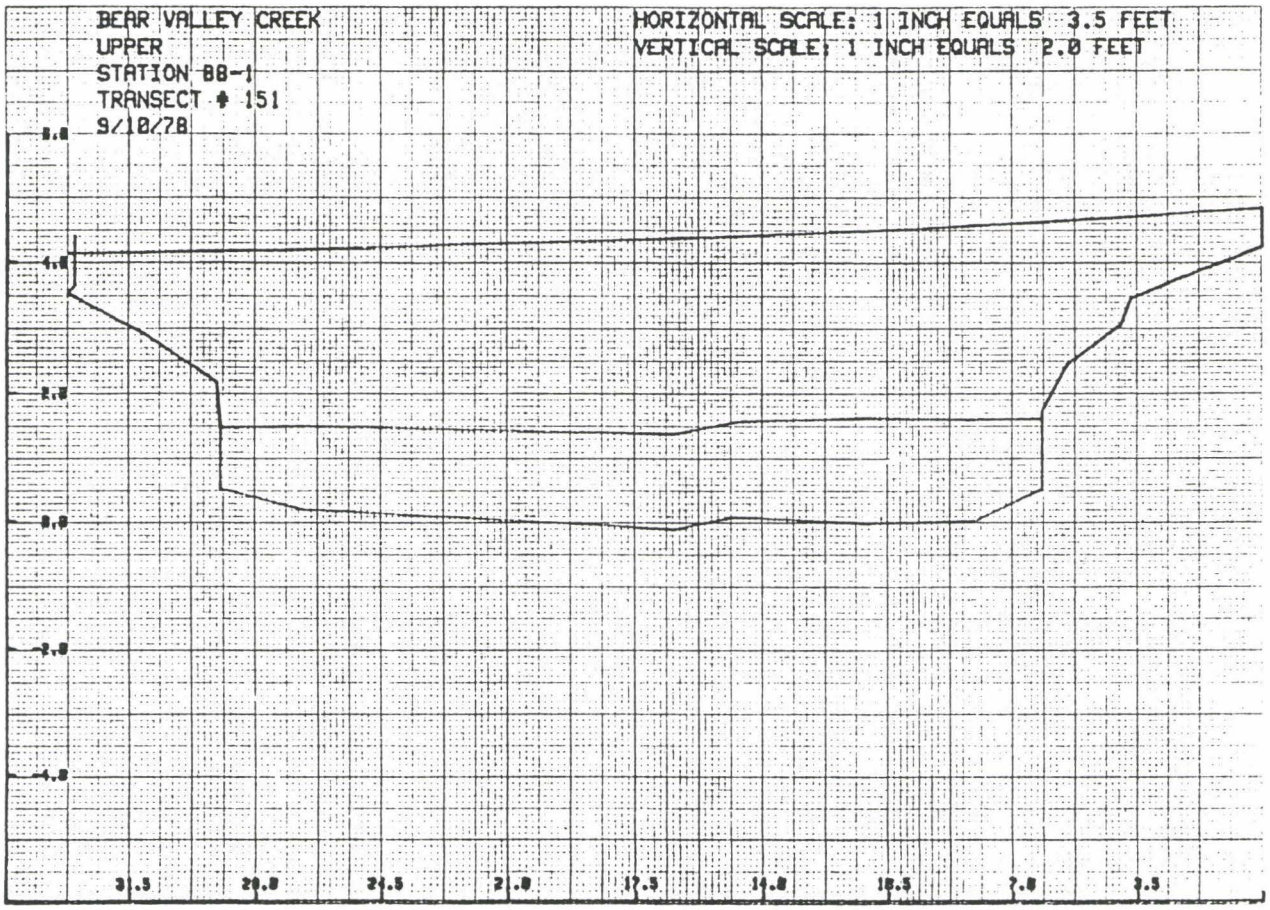

BEAR VALLEY CREEK
UPPER
STATION 88-1
TRANSECT # 92
9/11/78
HORIZONTAL SCALE: 1 INCH EQUALS 4.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
40.5
36.0
31.5
27.0
22.5
18.0
13.5
9.0
4.5

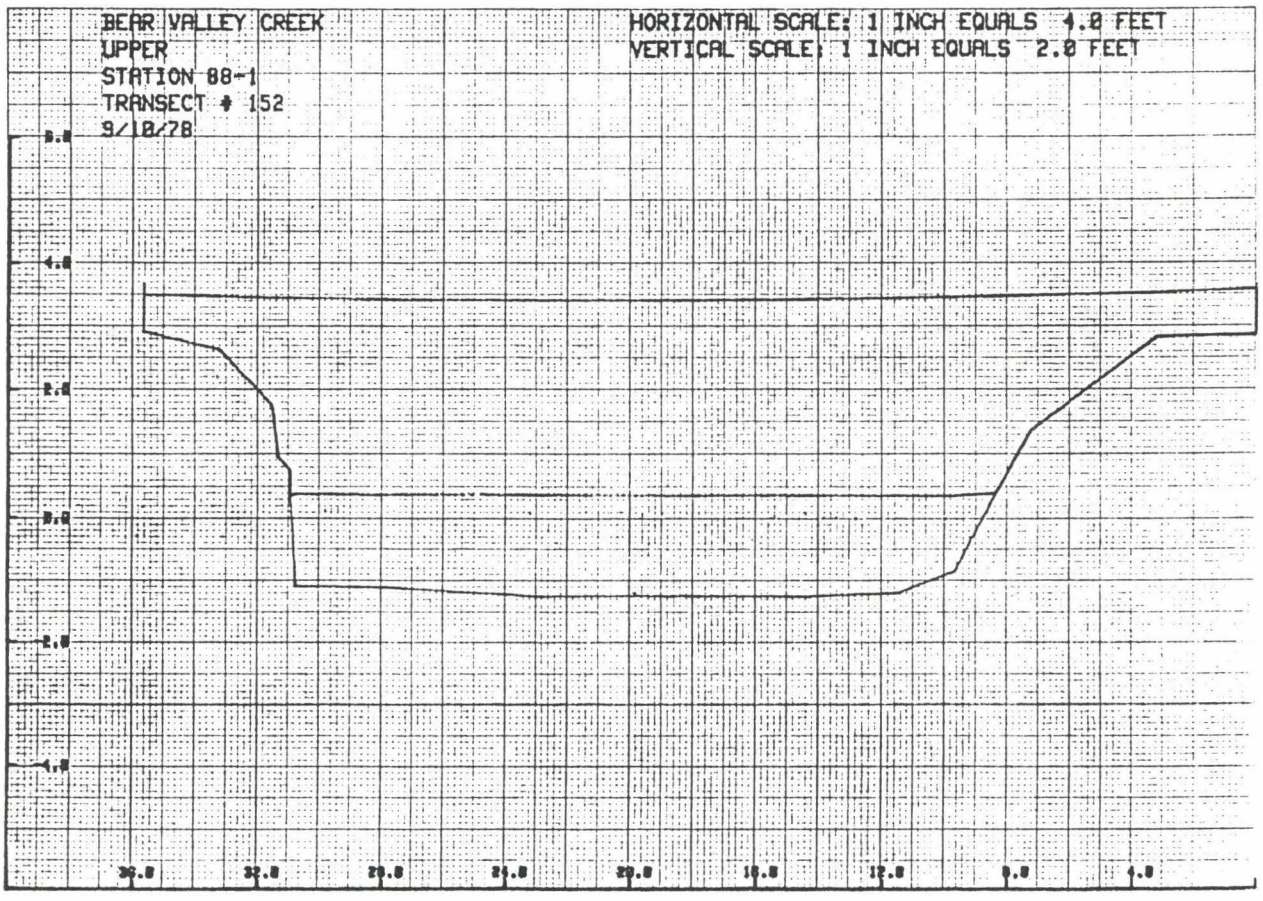

BEAR VALLEY CREEK
UPPER
STATION 88-1
TRANSECT # 147
9/10/78
HORIZONTAL SCALE: 1 INCH EQUALS 3.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
31.5
28.0
24.5
21.0
17.5
14.0
10.5
7.0
3.5

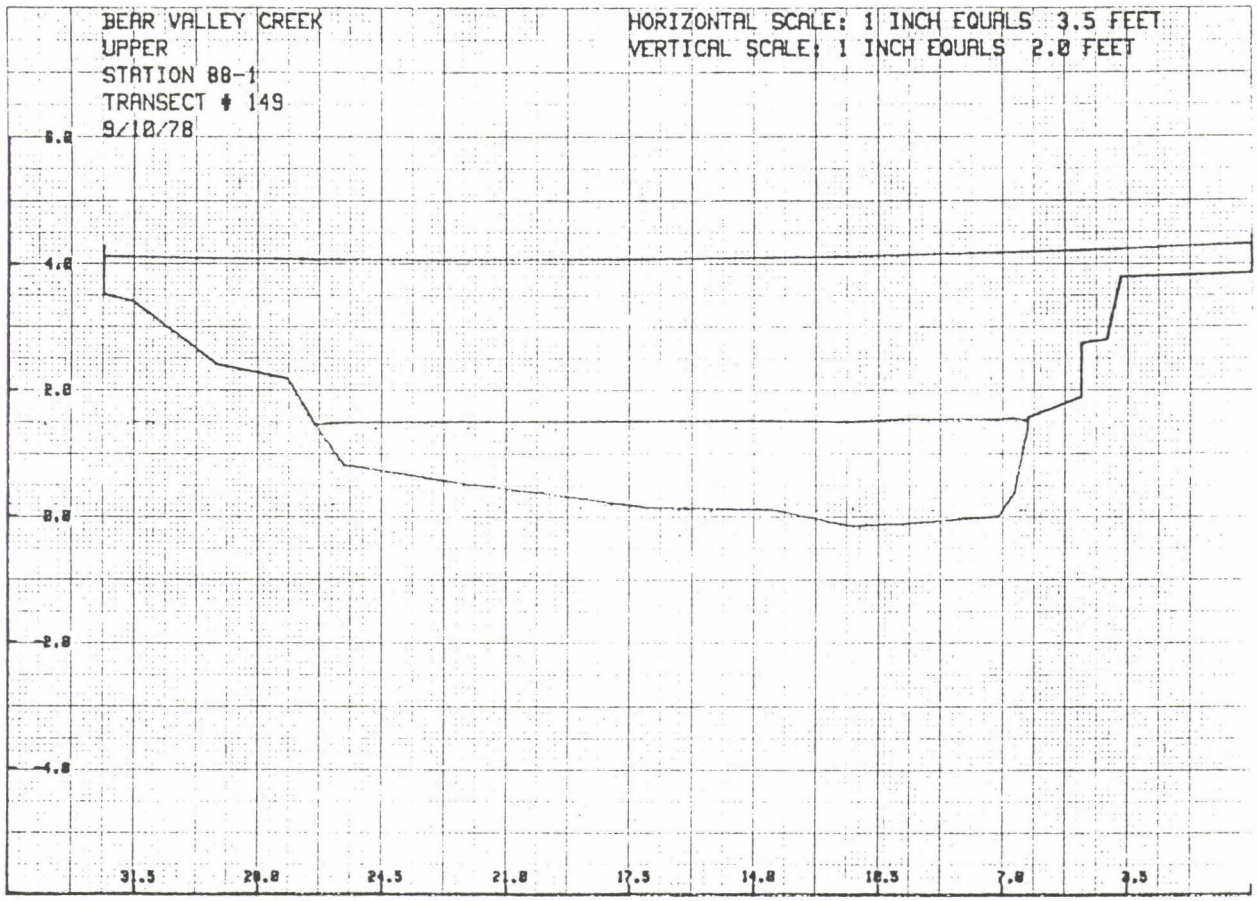

BEAR VALLEY CREEK
UPPER
STATION 88-1
TRANSECT # 148
9/10/78
HORIZONTAL SCALE: 1 INCH EQUALS 3.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 1.5 FEET
4.5
3.0
1.5
0.0
-1.5
-3.0
31.5
28.0
24.5
21.0
17.5
14.0
10.5
7.0
3.5

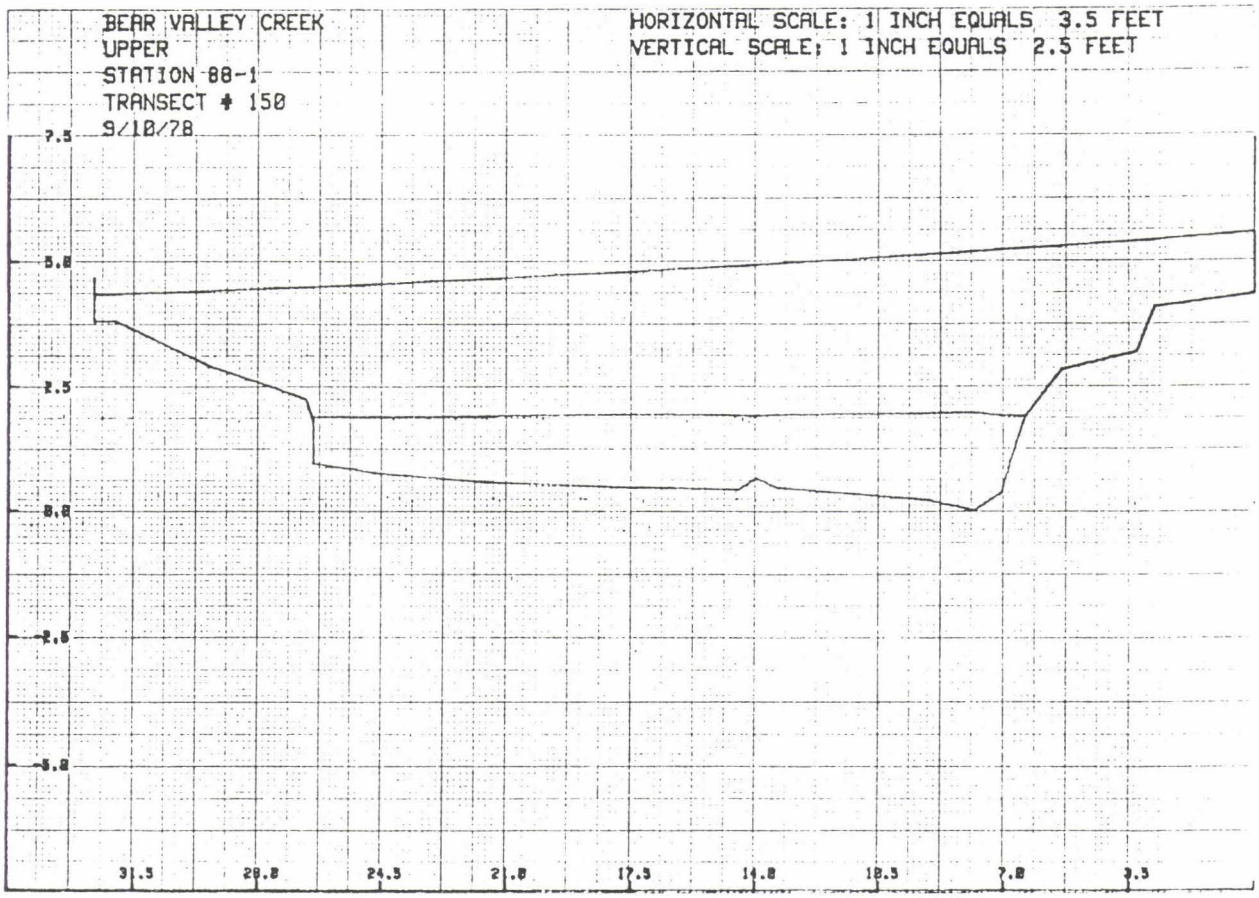

BEAR VALLEY CREEK
UPPER
STATION 88-1
TRANSECT # 95
9/11/78
HORIZONTAL SCALE: 1 INCH EQUALS 4.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
42.5
36.0
31.5
27.0
22.5
18.0
13.5
9.0
4.5

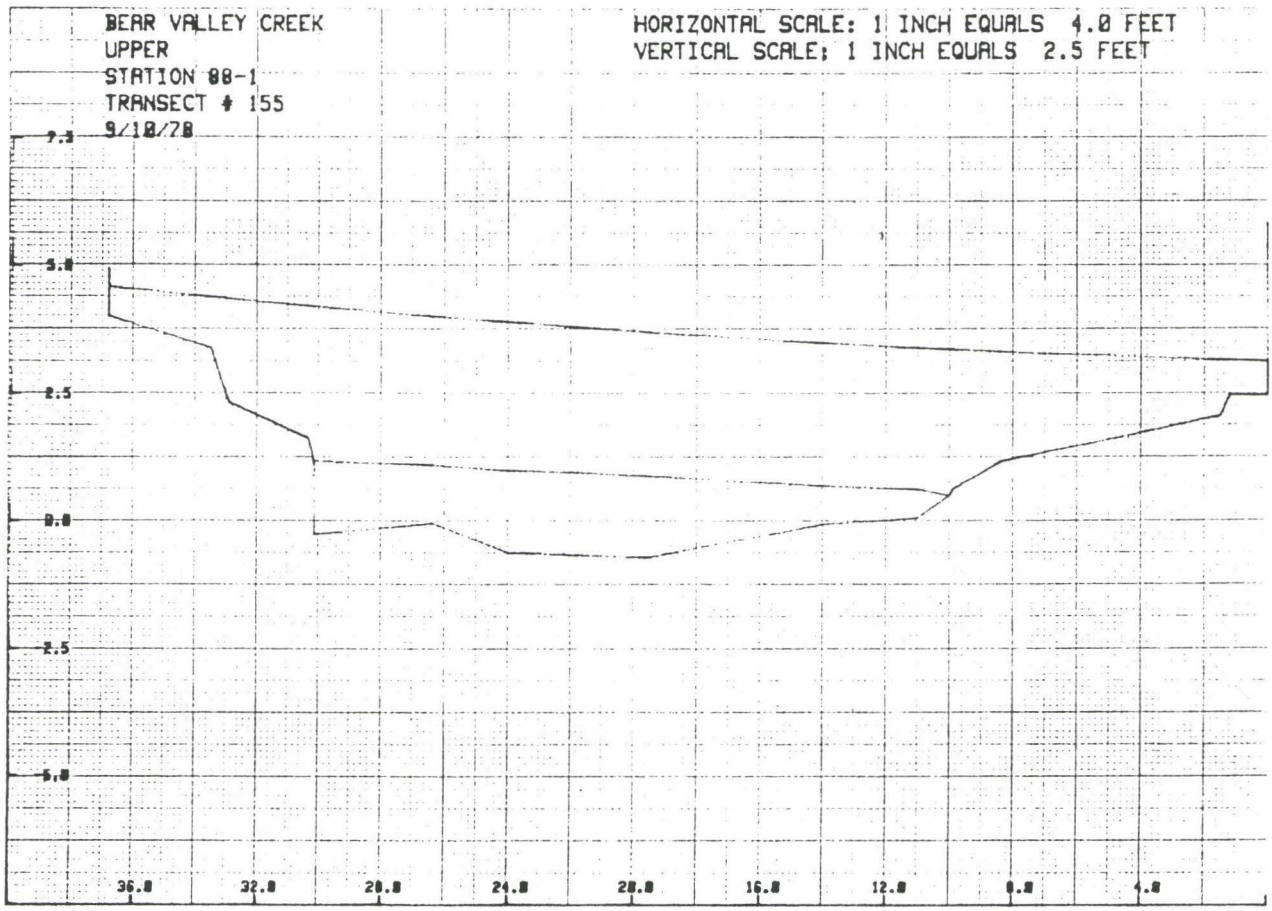

BEAR VALLEY CREEK
UPPER
STATION 88-1
TRANSECT # 146
9/10/78
HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
36.0
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0

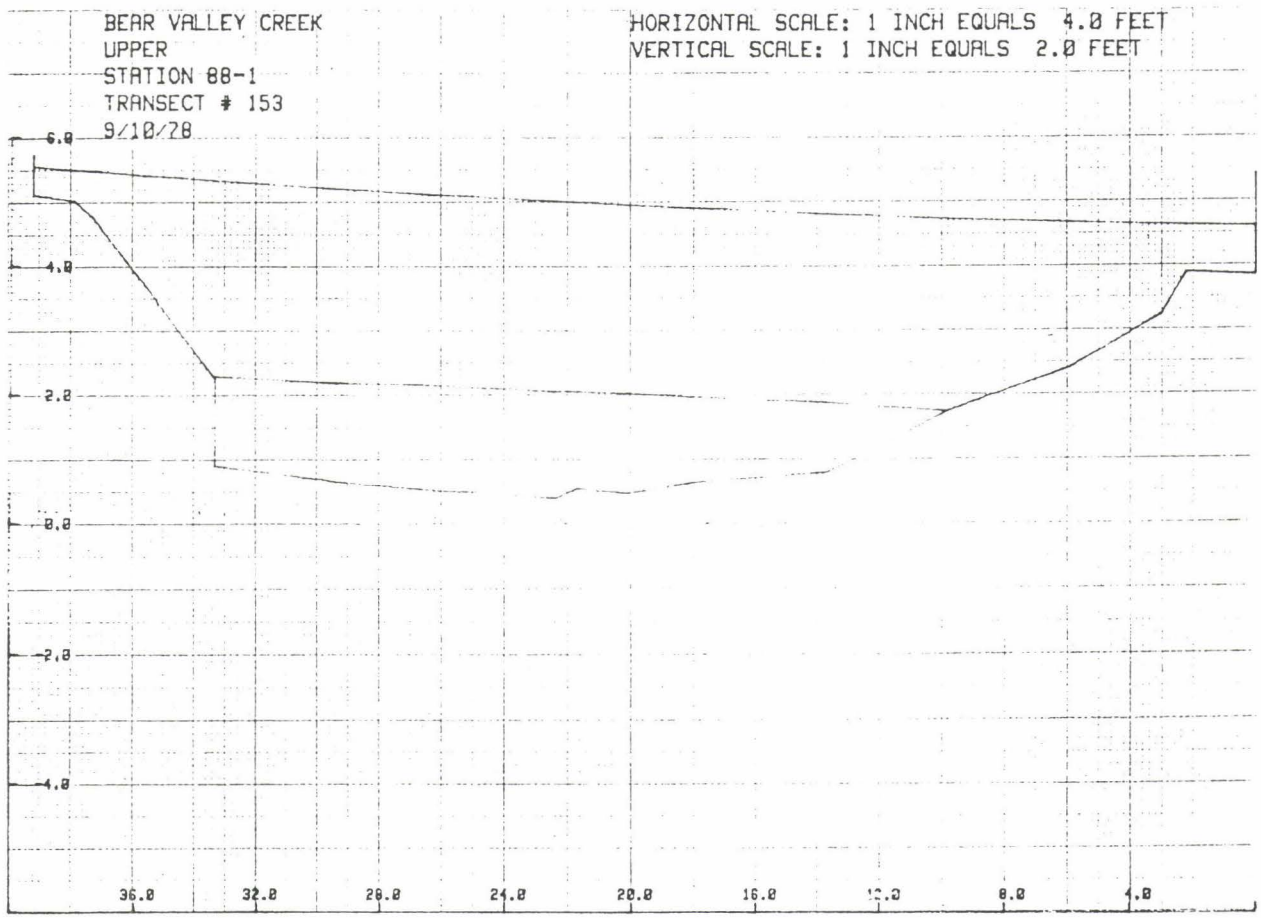

BEAR VALLEY CREEK
UPPER
STATION 88-1
TRANSECT # 151
9/10/78
HORIZONTAL SCALE: 1 INCH EQUALS 3.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
31.5
24.5
17.5
14.0
10.5
7.0
3.5

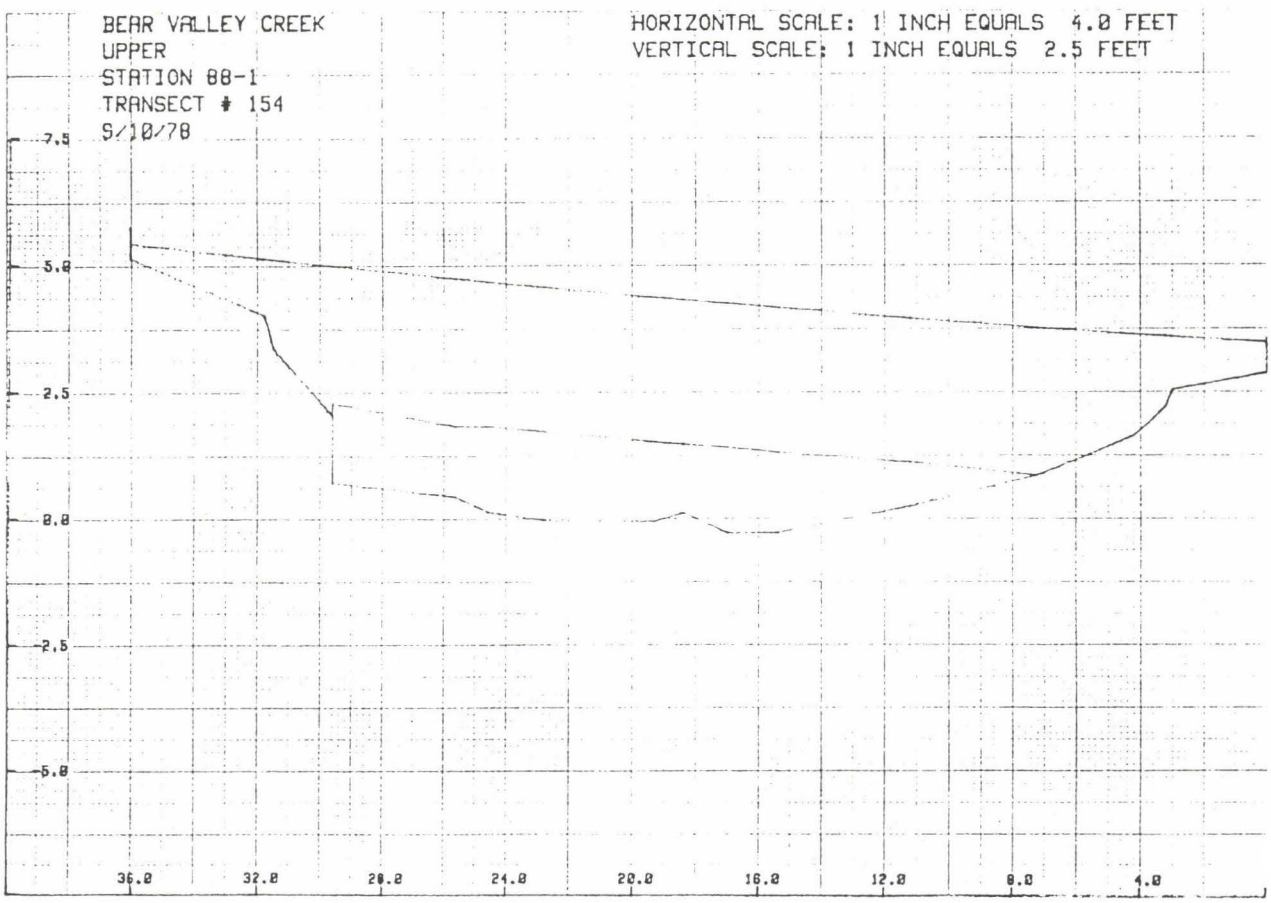

BEAR VALLEY CREEK
UPPER
STATION 88-1
TRANSECT # 152
9/10/78
HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET


BEAR VALLEY CREEK
UPPER
STATION 88-1
TRANSECT # 149
9/10/78
HORIZONTAL SCALE: 1 INCH EQUALS 3.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
31.5
28.0
24.5
21.0
17.5
14.0
10.5
7.0
3.5


BEAR VALLEY CREEK
UPPER
STATION 88-1
TRANSECT # 150
9/10/78
HORIZONTAL SCALE: 1 INCH EQUALS 3.5 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
31.5
28.0
24.5
21.0
17.5
14.0
10.5
7.0
3.5


BEAR VALLEY CREEK
UPPER
STATION 88-1
TRANSECT # 155
9/18/78
HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
2.5
5.0
36.0
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0


BEAR VALLEY CREEK
UPPER
STATION 88-1
TRANSECT # 153
9/10/78
HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.0 FEET
6.0
4.0
2.0
0.0
-2.0
-4.0
36.0
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0


BEAR VALLEY CREEK
UPPER
STATION 88-1
TRANSECT # 154
9/10/78
HORIZONTAL SCALE: 1 INCH EQUALS 4.0 FEET
VERTICAL SCALE: 1 INCH EQUALS 2.5 FEET
7.5
5.0
2.5
0.0
-2.5
-5.0
36.0
32.0
28.0
24.0
20.0
16.0
12.0
8.0
4.0